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Symposium on Syphilis*

THE CLINICAL MANIFESTATIONS OF PRIMARY SYPHILIS

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THE clinical manifestations of primary syphilis are frequently deceptive and varied. They range from an insignificant lesion, so slight as to pass without notice, to multiple inoculation sites with as many as twenty chancres in a single case. Invariably, whatever type the initial lesion assumes, there is a perceptible enlargement of the regional lymph nodes. In women, for example, with tertiary asymptomatic syphilis, approximately 40 per cent give no history and have no knowledge as to where, when or how they acquired their infection. Usually, however, careful history-taking and physical and laboratory examinations, together with a detailed follow-up of the family, reveal the approximate duration of the disease.

The typical Hunterian chancre, to the average physician, is the characteristic initial lesion marking the onset of syphilis. In this connection, we must not lose sight of the fact that this lesion, following a variable incubation period, requires from sixteen to twenty-one days to develop to clinical maturity. The local trauma created at the inoculation site is at first represented by a macule which develops into a papule. Local edema, lymphocytic and plasma cell infiltration, fibroblastic proliferation and eventually a peripheral obliterative endarteritis produce an eroded or ulcerative lesion, which in uncomplicated cases yields a serous exudate. The base of the erosion or ulcer is usually smooth, while the border is continuous and regular. Genital lesions of this type in men are usually painless, but it is not uncommon for them to be painful when present as an extragenital process or when involving the labia of a woman. The chancre may vary from one the size of a millet seed to an ulcerated tumor mass 10 cm. in diameter, or a large plaque involving the entire labial or scrotal surface. In fact, a chancre may assume almost any conceivable morphologic form and may occur on any accessible skin or mucosal surface.

In these days of greater discussion of syphilis by the laity, it is not uncommon to see patients at an early date following exposure. Often they present small denuded areas on the external genitalia which appear merely as superficial excoriations. A positive dark-field examination in a lesion of this type is as definitely diagnostic as it would be on a typical Hunterian chancre.

The significant fact in all these cases is that the clinical appearance of the lesions alone is not diagnostic. Laboratory evidence, either as a positive dark-field examination or as a positive serologic test for syphilis, or both, is necessary before an absolute or final diagnosis can be made, and certainly before treatment is instituted.

The pseudochancre redux, which is a gummatous recurrence at the site of the original chancre, may simulate primary syphilis. The redux lesion, however, yields a negative dark-field examination, seldom are the adjacent lymph nodes enlarged, and usually there is a history of syphilitic infection in the past.

Resistant lesions of primary syphilis are occasionally encountered. I treated one lesion of this type on the penis which persisted with positive dark-field examination after the patient had received a total of 5 gm. of arsphenamine, several treatments with an insoluble bismuth compound, and mercury and potassium iodide by mouth. The lesion was destroyed with radium. The patient re-

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covered from the syphilis in the usual fashion, in that he remained clinically asymptomatic and gave negative serologic reaction throughout the ten-year follow-up period.

Phagedenic genital lesions of syphilis are uncommon. Usually in these cases there is an accompanying Vincent infection, with large spiral organisms and fusiform bacilli which are of diagnostic significance.

The early lesions of lymphopathia venerea appear to be occurring more frequently in New England. These granulomatous lesions are not unlike those of early syphilis, but here the dark-field examination is negative, the Frei test is positive, and proper studies on the serum-albumin content of the blood are of diagnostic importance. Mixed infections occasionally occur. I have seen a case in which early syphilis, lymphopathia venerea and gonorrhea existed concomitantly in the same woman. To make matters worse, she also developed a sensitivity to bismuth and the trivalent arsenicals.

To diagnose a case as chancroid without completely excluding syphilis is an unsafe procedure. In approximately 54 per cent of infections of this type the two conditions are coexistent and syphilis is the major problem.

The possibility of meatus and hidden urethral chancres must not be overlooked. The conditions sometimes so closely resemble those of a nonspecific urethritis that differential diagnosis presents a problem for the expert.

In view of the fact that so many cases of tertiary syphilis present no history of primary syphilis but give one of gonorrhea, it would seem justifiable to conduct an adequate serological follow-up for syphilis in all cases of gonorrhea.

Extragenital lesions are not uncommon. They occur with frequency on the lips, eyelids, nipples and anal region of both sexes. Digital primary lesions are sometimes encountered among physicians. There are cases in the records of the Boston Dispensary of infants, three months and six months of age, acquiring primary syphilis through an infected relative, who having no knowledge of infection kissed the infant on the eyelid and brow. In this connection, a lesion which is indurated, is slow to develop and heal and is associated with a marked satellite adenopathy should arouse suspicion of chancre until proof to the contrary has been obtained.

Digital lesions of specific origin have a tendency to form a painful granulating mass which does not clear with the usual application of antiseptics, lotions and ointments; rather, the lesion slowly and painfully increases in size and occasionally presents a baffling problem. A lesion of this type is not unlike a melanotic whitlow. The importance of a dark-field examination in a persistent lesion of this type cannot be overemphasized.

Lip lesions of primary syphilis are frequently painful and swollen. I have clinical records of lesions of this type involving the upper lip and also the chin, which for weeks were treated with moist dressings, ointments and x-ray, on the assumption that they were carbuncles. In two such cases the secondary eruption had been mistakenly classified as dermatitis medicamentosa due to the use of sedatives.

The lip chancre may closely resemble a squamous-cell epithelioma. Time-consuming diagnostic procedures in lesions of this type are not to be countenanced. The aid of an experienced observer in such cases is expedient. The presence of a repeatedly negative dark-field examination, together with a negative serologic test for syphilis on the blood, will rule out syphilis in 80 per cent of cases. With this evidence in hand, a frozen-section diagnosis, with the patient prepared for immediate operation, can be accomplished within the first few days of medical responsibility. Cancer and syphilis, especially tertiary syphilis, may exist in the same lesion, and cancer has the preference with regard to treatment.

The further differential diagnosis of lip lesions should include lymphogranuloma, avitaminosis,—chiefly of the vitamin B complex group,—pseudochancre redux, inoculation tuberculosis, sarcoid, pyogenic granuloma, chancroid, blastomycosis and sporotrichosis.

Herpes of the lip deserves mention because occasionally a cluster of vesicles becomes confluent and superficial crusting develops. At this stage the lesion may resemble an early chancre of the lip. A herpetic lesion which requires more than two weeks for its involution should arouse suspicion of primary syphilis, especially if unilateral adenopathy has appeared. This applies also to a misdiagnosed, isolated, persistent impetigo-like lesion on the cheek or chin. The differential points here are recalcitrancy, lack of response to the usual treatment for impetigo and the complete absence of other impetiginous lesions, despite the fact that the signs may have persisted for two weeks or longer.

For lesions well inside the oral cavity or within the throat, a positive dark-field examination is not diagnostic. The reason is that normally there are spiral organisms inhabiting these regions which by dark-field examination are extremely difficult to differentiate from *Treponema pallidum*. They

are occasionally secondary invaders of lesions in the mouth or throat, the latter having an etiology entirely foreign to that of syphilis. I have seen such lesions in the throat, on the posterior half of the buccal mucosa or on the posterior two thirds of the tongue in nurses, social workers and physicians, which yielded "positive" dark-field examinations, but which cleared without treatment for syphilis. In these cases no further manifestations resembling syphilis occurred and serological follow-up through the succeeding year gave persistently negative results with the Hinton, Wassermann and Kahn reactions.

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THE INTERPRETATION AND RELIABILITY OF REPORTS OF SEROLOGICAL TESTS FOR SYPHILIS

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ACCIDENT has deprived you of the opportunity of listening to one of the foremost original contributors to the serological diagnosis of syphilis, and offers you instead a routine practitioner in the field whose major interests have been focused in other directions. I have nothing original to offer, and the data on which this paper is based are available to all, with minimal effort, in periodicals as widely distributed as the *Journal of the American Medical Association* and *Venereal Disease Information*. To those conversant with the field I can offer only a slight variation in emphasis and to the rest of you the saving of a few hours' time.

The greatest step in the serological diagnosis of syphilis since the discovery of the Wassermann reaction was unquestionably the development by Kahn[1, 2] of a reliable and highly sensitive precipitin or flocculation test. Other precipitin tests had already been devised, but neither their sensitivity nor their specificity had been great enough to offer significant advantages over the standard Wassermann reaction. Any doubt that still existed regarding the superior sensitivity of the flocculation method was dispelled by the results of the international serological conferences staged under the auspices of the League of Nations from 1923 to 1930. Meanwhile other flocculation tests were developed, and some of the older ones were renovated in the light of newly discovered principles. It would be profitless to catalogue them. Four tests have emerged which have won wide acceptance in this country and which deserve discussion: the Kahn, the Kline,[3] the Hinton[4] and the Eagle.[5] In the meantime a slower and less advertised improvement in Wassermann-test technics has occurred and the methods of Kolmer[6] and Eagle[5] have won general attention.

The United States Public Health Service, in association with the American Association of Clinical Pathologists, has performed a most useful service in arranging a series of serological conferences in this country at which large numbers of blood specimens from known cases of syphilis and of control specimens from presumably nonsyphilitic individuals have been submitted to the expert serologists already mentioned, and also to other laboratories. The results have been extremely illuminating. In Table 1 are given some figures from the second conference.[7–9]

TABLE 1. *Sensitivity and False-Positive Reactions Using Various Serological Tests for Syphilis (Second Conference).*

TEST	SENSITIVITY	FALSE-POSITIVE REACTIONS
	%	%
Kline	93.7	1.9
Kline (exclusion)	92.5	4.0
Hinton	91.3	0.0
Eagle (complement-fixation)	87.7	0.0
Eagle (flocculation)	84.1	0.0
Kahn (presumptive)	82.2	1.0
Kahn	81.0	2.0
New York State (complement-fixation)	77.7	1.9
Kolmer (complement-fixation)	59.5	0.0

In any single series of this type the number of serums (approximately 300) is too small to justify statistical comparison. In successive conferences, moreover, both the sensitivity and the specificity of every test have varied within considerable limits. In Table 2 are listed the relative rankings in sensitivity and specificity in three successive conferences. In each of the paired series of figures the first number indicates the rank from the point of view of sensitivity, the second from that of specificity. The tendency to an inverse relation is obvious in the 1934 and 1937 figures. None of the 1938 tests showed any false-positive reactions.

It is apparent from these figures that there is no perfect serological test for syphilis. Both the sensitivity and the specificity of each test studied

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fluctuate within considerable overlapping ranges. Good flocculation tests should give from 80 to 90 per cent positive results in syphilitic serums, but as the upper limit is reached false-positive results begin to appear. Complement-fixation tests can be counted on for only 70 to 80 per cent sensitivity, but are somewhat less likely — provided they are properly performed — to produce false-positive results.

For those of you who practice in Massachusetts it is worth emphasizing that the Hinton test is at least as sensitive as any, probably the most sensitive of all tests, and considering its extremely high sensitivity is remarkably specific. Crawford and Ray[10] have recently completed a survey of 21,000 Hinton tests performed in the Pathology Laboratory of the Massachusetts General Hospital. One hundred and forty-four cases showed positive reactions without confirmatory evidence of syphilis. In 90 of these, syphilis could be confidently excluded. The proportion of false-positive reactions, including all technical errors, lies somewhere between 0.4 and 0.7 per cent; if the 48 cases with patent technical errors are excluded it is almost exactly 0.5 per cent. If the Hinton test is consistently positive the chances that the patient has syphilis are at least two hundred to one.

TABLE 2. *Rankings of Various Serological Tests according to Specificity and False-Positive Reactions (1934, 1937 and 1938 Conferences).*

TEST	RANKINGS		
	1934	1937*	1938
Hinton	1–6	3–0	1
Kline (exclusion)	2–7	2–8	2
Kahn (presumptive)	3–5	6–5	3
Eagle (flocculation)	4–4	5–0	7
Kahn	5–3	7–7	8
Kline	6–1	1–6	5
Kolmer (complement-fixation)	7–2	8–0	4
Eagle (complement-fixation)		4–0	6

*A zero indicates no false-positive reactions.

Parran[9] has provided us some other figures which are well worth serious contemplation. The serological laboratories of all forty-eight states were invited to compete under similar conditions, checking their results against those of the expert serologists whose tests they were using. Thirty-nine accepted the challenge. A few of the results are shown in Table 3. It is all too evident that the variations between laboratory and laboratory are far greater than those between one test and another. Certainly Parran was not unduly stringent in his conclusion, "Some of the state laboratories are qualified neither to perform efficient laboratory service nor to inaugurate any system of state licensure or approval of local laboratories." Protagonists of compulsory premarital serological examination should study these figures. To the practitioner the moral is obvious: It is far more important to select carefully the laboratory to which you send your material than it is to worry about the particular test to be applied. As residents of Massachusetts we can feel proud that, due to the inventiveness and ability of Dr. William A. Hinton, our state laboratory was selected as one of the four yardsticks against which the achievements of the rest of the country were measured.

In the interpretation of serological tests for syphilis two premises must be constantly borne in mind. There are cases — or, perhaps better, stages — of progressive syphilitic infection in which one or another, or even all, the available serological tests are negative. There is no exclusion test for syphilis, although that name has unfortunately been applied to a modification of the Kline test.

Many of these negative reactions yet await explanation. Some may be definitely regarded as paradoxical, based on zone reactions. The content of antibody may be too great. In such cases dilution of the serum will produce a positive result. I have seen these zone reactions with the Hinton and the Kahn tests, and they have been reported[11] with the Wassermann and the Kline tests. The more sensitive the test, the greater is the likelihood of this reaction.

On the other hand, there occur with all known tests occasional false-positive results. Some of these, even in the best of laboratories, must be classed as technical errors. They can usually be quickly identified because a single positive reaction is followed by a consistent string of negative ones. Others must be classed as true false-positive reactions since they persist over long periods of time.

TABLE 3. *Results of Serological Tests in Various State Laboratories.*

TEST	LABORATORY NO.	SENSITIVITY	FALSE-POSITIVE REACTIONS
		%	%
Kolmer		88.0	0
	36	87.7	10.1
	8	55.0	0
	3	38.7	0
Kahn		84.5	0
	36	91.9	4.0
	33	95.9	9.1
	34	52.1	0
Hinton		92.9	0
	24	92.9	0
	14	81.0	0
	32	46.7	0
Kline		83.9	0
	2	65.6	0
	10	90.7	0
	30	88.8	3

They occur with predictable frequency in certain diseases: yaws, 100 per cent; leprosy, 50 per cent; malaria, 10 per cent.[12] More important in Massachusetts is infectious mononucleosis. No figures covering the frequency of false-positive reactions in this disease are yet available, but every serologist has met a significant number of examples.

Other false-positive reactions appear without consistency, usually but not necessarily disappearing in a few days or weeks, in a great variety of conditions, such as streptococcal infections, acute disseminated lupus and even chronic pulmonary tuberculosis.[13] Every positive serologic reaction unsupported by anamnestic or clinical evidence of syphilis demands frequent repetition, and preferably confirmation with another type of test.

With a multiplicity of tests, discrepant results are certain. Schoch[14] reports that in Dallas, where five tests are used routinely, discrepancies appear in 25 per cent of the serums tested. How are these to be evaluated? Repeated examinations and careful and prolonged clinical correlation are the only available methods. Studies such as those of Crawford and Ray and of Schoch, already quoted, and those of Stillman[15] are steadily increasing our knowledge. Where the Hinton or Kline test is positive and the Wassermann test negative the chances are two or three to one that the patient has syphilis. No blanket rule can be laid down, however, and each case must be carefully evaluated as an individual problem.

The serodiagnosis of syphilis is an expert's job. Advertisers to the contrary notwithstanding, there exists no foolproof, instantaneous method suitable for individual testing in the doctor's office laboratory. Every short cut that has been attempted decreases both sensitivity and specificity. There is no possible way of adequately controlling the individual test, whereas in the large laboratory, variations in sensitivity rapidly become apparent if the percentage of positive results shifts significantly in one direction or the other.

Conclusions

The serological diagnosis of syphilis has advanced greatly in the last fifteen years, but there is still no perfect test for the disease. A negative reaction does not rule out and a positive one does not prove the presence of syphilis. The percentage of accurate diagnoses can be considerably increased by the use of multiple tests, but in the face of discrepant reports every case requires individual interpretation and the most exact clinical correlation.

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THE DETECTION AND TREATMENT OF CARDIOVASCULAR SYPHILIS*

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OF THE main types of heart disease, cardiovascular syphilis is the only one which is wholly preventable. Even when it is once established, early detection and proper treatment will stay its progress and prevent many of the serious complications. Nevertheless, this condition is responsible for more adult deaths than is neurosyphilis, and constitutes 10 to 15 per cent of all cardiovascular disease. This deplorable situation is clearly not a consequence of meager available knowledge, but is rather to be ascribed to failure in detection and to inadequate treatment.

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Detection

From the clinical point of view, cardiovascular syphilis consists essentially of syphilitic aortitis, with or without its three main complications, aneurysm, aortic regurgitation and narrowing of the ostia of the coronary arteries. The *Treponema*

pallidum invades the thoracic aorta before or during the secondary stage of the disease, and inflammatory reaction continues to smolder for months or years, until sufficient damage has been created to give rise to clinical signs or symptoms.[1] The highest incidence of clinical manifestations occurs fifteen to twenty years after infection, but the interval may range from several months to fifty years. Almost all syphilitic patients show characteristic anatomic changes in the aorta at postmortem examination, whereas only 10 to 12 per cent have demonstrable clinical signs or symptoms. The diagnosis of syphilis consequently carries the implication that the aorta is or has been involved, even if clinical signs are not apparent.

By the time the diagnosis of cardiovascular syphilis can be based on frank clinical evidence, serious and often irreparable damage has already occurred. Any conspicuous reduction in the incidence of the disease depends primarily on the detection and adequate treatment of early syphilis in general, for cardiovascular syphilis occurs in less than 1 per cent of cases adequately treated early in the course of the disease.[2, 3] Thus in practically every case the clinical diagnosis of cardiovascular syphilis is evidence of previous neglect.

A consideration of the detection of cardiovascular syphilis comprises the detection of syphilis and of characteristic signs and symptoms of cardiovascular involvement.

In the detection of syphilis a negative serologic test does not preclude a positive diagnosis. From 20 to 30 per cent of patients with syphilitic aortitis or its complications have a negative serologic reaction. The diagnosis in these individuals must rest entirely on the history and physical examination. A history of syphilis or the description of an illness consistent with it must be sought by detailed direct questioning. The disclosure on physical examination of stigmas involving other organs raises a strong presumption in favor of the diagnosis.

The tendency of syphilitic infection to involve multiple parts of the body is reflected in the finding that from 50 to 60 per cent of untreated cases of syphilitic aortitis show evidence of neurosyphilis.[4] Conversely, at least 35 per cent of patients with neurosyphilis have been observed to show clinical evidences of cardiovascular syphilis.[5] If arsenic in the amounts usually employed in neurosyphilis is given to the latter group, the danger of cardiac damage is great.

The physical signs of cardiovascular syphilis are the signs of syphilitic aortitis, with or without its complications. The principal symptoms and signs of uncomplicated syphilitic aortitis, recorded in the cases of the Co-operative Clinical Group[6] material, are as follows, in the order of their importance: teleroentgenographic and fluoroscopic evidence of aortic dilatation; a tympanitic, bell-like, tambour accentuation of the aortic second sound; a history of circulatory embarrassment; increased retromanubrial dullness, progressive cardiac failure, substernal pain, paroxysmal dyspnea, systolic aortic murmur and visibly or palpably increased pulsation in the episternal notch. Moore and his associates[7] believe that the presence of three or more of the first seven of these signs or symptoms in a patient with known late syphilis under fifty years of age is strong evidence for the diagnosis of uncomplicated syphilitic aortitis, and that the presence of any two of them renders the diagnosis probable.

Depending on the location and extent of the syphilitic process, the primary lesion of aortitis may be complicated by saccular aneurysm, aortic insufficiency or stenosis of the coronary ostia with resultant angina pectoris. Syphilitic myocarditis occurs but rarely. The suspicion of syphilitic involvement in any of the above conditions is strengthened if the onset is relatively abrupt, the past history of heart disease is negative, and the clinical course is rapidly progressive. Male patients predominate in the ratio of approximately 5:1.[8] To summarize, a positive diagnosis of cardiovascular syphilis can be made only when at least one of the following findings is present: a saccular aneurysm of the aorta or innominate artery; aortic regurgitation, appearing for the first time in a middle-aged person with a positive serologic reaction for syphilis; or a diffusely dilated aorta without aortic regurgitation or hypertension, past or present.

Treatment

The treatment of cardiovascular syphilis is aimed to relieve symptoms, prevent progression, and achieve gradual healing of the lesions. Reversal of the serologic reaction is not a primary objective. The earlier the stage of involvement, the greater the possibility of success. Thus, in uncomplicated syphilitic aortitis, adequate treatment has been observed to increase the average duration of life after detection from thirty-four to eighty-five months, whereas in aortic regurgitation the average duration was increased from forty months in the untreated to only fifty-five months in those receiving therapy.[6]

The former pessimism regarding the treatment of cardiovascular syphilis was due in part to the

sudden deaths or rapid deterioration which not infrequently followed vigorous arsenical therapy. The more favorable results of recent years have been attained by utilizing iodides and the heavy metals as the main basis of therapy.

The treatment of the patient with cardiovascular syphilis must consist in the first place of those measures, such as the regulation of activity and exercise, diet and other general hygienic measures, that have proved of value in the treatment of all heart disease. Particular attention must be directed to oral hygiene if the heavy metals are to be used. Congestive failure of even slight degree must be treated with prolonged bed rest before instituting specific therapy.

Bismuth

While there is some difference of opinion regarding the various preparations of bismuth injected intramuscularly, the insoluble salts such as the subsalicylate suspended in oil have gained widespread adoption. Local reactions are mild, and if proper oral hygiene is practiced stomatitis causes but little difficulty. Renal damage must of course be avoided by weekly examination of the urine, but fortunately albuminuria and casts usually disappear rapidly on the reduction or omission of therapy. Initially, daily injections of 0.1 gm. of an oily suspension of bismuth salicylate every four or five days for four or five injections[9] are employed. If these are well tolerated, the dosage is increased to 0.2 gm. once a week for at least two or three months.

Iodides

Iodides by mouth are given concomitantly, Moore and his associates[9] recommending 1.3 gm. of potassium iodide three times a day, with a rapid increase to as much as 12 gm. daily. Stokes and Anderson,[10] however, employ more moderate doses (0.3 to 0.6 gm.) three times a day.

Arsenicals

Arsenicals are never administered until preliminary treatment with bismuth and iodides has been carried out for two to six months, and then only in small doses. Under no circumstances should severe reactions to treatment be risked, for considerable harm to the patient may result. The use of arsphenamine is contraindicated. Initial doses of 0.05 or 0.10 gm. of neoarsphenamine may be given, the dose being cautiously increased at weekly intervals to a maximum of 0.30 or even 0.45 gm. This course of treatment usually lasts ten or twelve weeks. At its conclusion iodides and injections of bismuth are again given, and the two methods of therapy are alternated for a minimum of two years. After that time long rest periods are permissible, but a course of bismuth and a course of neoarsphenamine are usually advisable once a year for the remainder of life. Bismarsen rather than neoarsphenamine has been utilized by Stokes, Miller and Beerman[11] in cases in which reactions had occurred or were expected. These authorities, as well as Moore and his associates,[9] find this preparation safe and effective. A final evaluation of the effectiveness of Mapharsen and of the recently introduced Sobisminol is not as yet possible.

The above schedule of treatment must of course be adapted to the requirements of the particular patient. Since, however, iodides and bismuth are well tolerated, they may usually be given to patients with advanced cardiovascular lesions. If angina pectoris or aortic regurgitation exists, or congestive failure has been present, arsenicals are to be given in small doses with extreme caution or to be omitted entirely, whereas in syphilitic aortitis, with or without saccular aneurysm, the somewhat greater above-mentioned amounts may be utilized. In the management of these cases the governing basic principles have been well delineated by Stokes[12] and by Moore[13]:

Prolonged adequate treatment is necessary.

The value and danger of each drug must be clearly realized.

The patient must be questioned at each visit for symptoms or signs of toxicity.

The possible benefits must be carefully weighed against the possible dangers. Rapid healing of local lesions such as those about the root of the aorta is dangerous and the arsenicals if given too vigorously may lead to a Jarisch-Herxheimer reaction of "therapeutic paradox." Intensive therapy is borne more satisfactorily by young patients than by old patients.

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THE EARLY CLINICAL AND LABORATORY MANIFESTATIONS OF SYPHILIS OF THE CENTRAL NERVOUS SYSTEM*

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IT IS now well known that when the central nervous system is involved by syphilis this involvement takes place in the early stage of the infection. With the dissemination of the spirochetes at the time of the appearance of the secondary rash, the cerebrospinal fluid is infected.[1] The presence of the spirochetes in the central nervous system does not usually produce any symptoms except for a mild or moderately severe headache at the time of the rash, but abnormalities in the cerebrospinal fluid are quite frequent. The literature[2] since the report of Ravaut[3] in 1903 contains a large number of reports on the results of examination of the cerebrospinal fluid in the early stages of syphilis. The majority of the investigations report abnormalities in 25 to 40 per cent of the fluids removed after the appearance of the secondary rash (Table 1). The very significant conclusion which can be drawn from these studies is not that the cerebrospinal fluid may be involved in the early stages, but that when it remains normal for two or more years after the primary infection it will always remain so and parenchymatous neurosyphilis will never develop. The importance of this fact is obvious in that it permits the accurate forecasting of the possibility or probability of future serious symptomatic neurosyphilis and allows time for preventive therapy.

TABLE 1. *Frequency of Abnormalities in the Cerebrospinal Fluid in Early Syphilis.*

Author	Designated Stage of Disease	No. of Cases	Cases with Abnormalities of Spinal Fluid
			%
Cornaz[4]	Early	—	35
Nicolau[4]	Early	51	35
Bering[4]	Secondary	372	32
Wile and Hasley[4]	Early	221	22
Mills[4]	Primary	283	9
	Secondary	768	35
Zurhelle and Krechel[4]	Early secondary	113	16
	Late secondary	31	48

The presence of abnormalities in the cerebrospinal fluid at the early stages does not necessarily mean that the patient will develop dementia paralytica or tabes dorsalis in the distant future since the fluid may become sterilized spontaneously or as the result of treatment in a small or large percentage of these patients, depending on the development of immunologic reactions and the amount of treatment received.

The degree to which abnormalities are present in the spinal fluid in the early stages is of some meaning in regard to the prognosis. Minor changes — slight increase in cells, slight increase in protein and a weakly positive Wassermann reaction — respond readily to treatment. On the other hand, when there is a pleocytosis, increased protein, an abnormal colloidal-gold curve and a strongly positive Wassermann reaction, intensive treatment is necessary to prevent the development of serious neurosyphilis.

In a study of patients in the latent period, that between the primary infection and the development of symptoms of the late manifestation of the disease, Moore[5] found that cerebrospinal fluid abnormalities were three times as frequent in patients who had received irregular treatment as in those whose treatment had been continuous, and that serious abnormalities were ten times as frequent in the irregularly treated group as in the group that had received good treatment.

From the above it is obvious that the central nervous system is frequently involved in the early stages of the infection. Clinical symptoms or signs of this involvement have always been uncommon, and they are now quite rare. This decrease in the frequency of clinical evidence is doubtless due to the more efficient treatment of early syphilis. The clinical symptoms in the early stages of the disease are the result of involvement of the meninges or the blood vessels. These may occur separately or there may be a mixture of both in the same individual. The symptoms may be confined to the brain or to the spinal cord.

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Syphilitic Meningitis

Syphilitic meningitis[6] usually develops within the first six months of the infection, and the signs and symptoms of the inflammation of the meninges may be present along with the secondary rash. It was argued for some time that the appearance of syphilitic meningitis was due to treatment with arsenic, the theory being that the arsenic had driven the spirochetes into the nervous system and caused the meningitis. This hypothesis is, of course, without foundation, and probably arose from the fact that the introduction of arsenic in the treatment of syphilis was coincidental with the development of the technic of removing and examining the cerebrospinal fluid. In the vast majority of cases the meningitis develops in patients who have received no previous treatment or an amount that was entirely inadequate. A common story is for the patient to report to the doctor with a primary lesion and receive three to six injections of an arsenical, and allow the treatments to lapse. After an interval of six to twelve weeks, he begins to complain of headache, nausea and vomiting and cranial-nerve paralyses appear. He is thereupon admitted to the hospital with the full-blown clinical syndrome of syphilitic meningitis and the typical cerebrospinal-fluid abnormalities.

Syphilitic meningitis is a relatively rare complication of syphilis, occurring in less than 0.5 per cent of the cases, and since emphasis has been placed on the value of arsenic in the treatment of early syphilis, the condition is now a clinical rarity. I have never seen it develop in a patient while receiving regular treatment with one of the arsenicals, but it was not an uncommon experience for the symptoms to have their onset while the patient was supposedly taking mercury rubs at home.

Patients with syphilitic meningitis of the brain may be divided into three groups, according to whether symptoms are present indicating selective involvement of the meninges at the base or over the convexity of the brain. The first group (acute syphilitic hydrocephalus[6]) comprises those cases without evidence of any selective involvement. The signs and symptoms include headache, nausea, vomiting, choked disk, stiffness of the neck and abnormalities in the cerebrospinal fluid. The symptomatology is due to an excess formation of cerebrospinal fluid and an impairment of the absorption of the fluid resulting from the inflammatory reaction. The following case is a typical example.

Case 1. M. P., a 24-year-old woman, was admitted to the hospital in March, 1933, with complaints of headache, weakness, vomiting and blurring of vision for 3 weeks. In May, 1932, she had had a secondary rash and was given nine intravenous injections of neosalvarsan and ten intramuscular injections of bismuth. She was nauseated and vomited after the intravenous injections, and did not return for treatment after December, 1932.

On examination there was stiffness of the neck, choked disks and generalized hyperreflexia. The blood Kahn test was positive. The cerebrospinal fluid was under pressure of 300 mm. of water; it contained 250 lymphocytes and 35 polymorphonuclear leukocytes per cubic millimeter and 59 mg. of protein per 100 cc., the colloidal-gold curve was 0012223210 and the Wassermann reaction was positive. The cerebrospinal-fluid pressure was controlled by lumbar punctures, and the patient was given injections of neosalvarsan and bismuth. After 3 weeks she was discharged improved. Treatment was continued in the Out-Patient Department, and after 1 year she was symptom-free. The blood Kahn test was negative, and the cerebrospinal fluid was entirely normal.

In the second group (basilar meningitis) the inflammatory process is concentrated around the base of the brain and in addition to the general symptomatology of increased intracranial pressure there occur the symptoms due to involvement of the various cranial nerves. The nerves around the cerebellopontine angle (sixth, seventh and eighth) are most frequently affected, and those in the interpeduncular space (second and third) come next (Table 2). The following case is illustrative.

Table 2. *Relative Frequency of Involvement of the Various Cranial Nerves in Syphilitic Meningitis.*[6]

Cranial Nerve	Involvement %
I	1.5
II	26.0
III	23.0
IV	2.5
V	11.0
VI	21.0
VII	40.0
VIII	41.0
IX, X	6.0
XI	0.5
XII	3.5

Case 2. N. A., a 22-year-old housewife, was admitted to the hospital in November, 1930, complaining of headache, dizziness, tinnitus and slight loss of hearing in the right ear and paralysis of the right side of the face of 2 weeks' duration. In July, 1930, she had had a secondary rash and received four injections of neosalvarsan.

On examination there was horizontal nystagmus, slight impairment of hearing in the right ear, paralysis of the right 7th nerve and weakness of the right 6th and left 7th nerves. The deep reflexes were hyperactive. The blood Kahn test was negative. The cerebrospinal-fluid pressure was normal; the fluid contained 340 cells per cubic millimeter and 73 mg. of protein per 100 cc.; the colloidal-gold curve was 4333333322 and the Wassermann reaction was positive. The patient was treated with neosalvarsan, Tryparsamide and bismuth, with rapid improvement of symptoms, and at the end of 18 months of treatment she was symptom-free and the cerebrospinal fluid was entirely normal.

The third group of cases (vertical meningitis) are those in which the meningeal involvement is concentrated over the convexity of the brain. These patients show, in addition to the signs of increased intracranial pressure, mental symptoms, confusion and convulsive attacks, and it is in this group that vascular lesions with transient or permanent hemiplegias are commonest. The following case is typical.

Case 3. M. J., a 33-year-old salesman, was admitted to the hospital in 1931 with the complaint of headaches and three minor convulsive attacks in the last 3 months. He had had a small penile lesion 1 year previously, which disappeared without treatment. The neurological examination was not significant. The blood Wassermann test was positive. The cerebrospinal fluid was under pressure of 200 mm.; it contained 117 white cells per cubic millimeter and 192 mg. of protein per 100 cc.; the colloidal-gold curve was 0001222222 and the Wassermann reaction was positive. The patient was treated with neosalvarsan, Tryparsamide and bismuth, with complete relief from symptoms. The blood Wassermann test was negative and the cerebrospinal fluid was entirely normal after 15 months of treatment.

A patient with syphilitic meningitis should be hospitalized and treated intensively with one of the arsenicals and one of the heavy metals. The cerebrospinal-fluid pressure can be controlled by spinal punctures at appropriate intervals. The arsenical should be administered in proper doses at four- to six-day intervals, together with the heavy metal intramuscularly and iodides by mouth. Under this regime the symptoms rapidly disappear, the cerebrospinal fluid pressure falls to normal and the swelling of the optic disks subsides. Two or three weeks in the hospital is generally sufficient to restore the patient to nearly normal. Complete recovery of paralyzed cranial nerves may require more time, and it is unusual for complete recovery to result when the eighth nerves have been affected. This is explained by the fact that the paralysis of the eighth nerve may not be due to the meningitis alone, but also to the concomitant lesions in the nutrient artery of the nerve. The important fact to be borne in mind in all cases of syphilitic meningitis is that treatment must be continued for at least eighteen months. Alternating series of one of the arsenicals and one of the heavy metals should be given, with control of the cerebrospinal fluid at intervals of six months. The treatment should be continued until the cerebrospinal fluid is entirely normal and for at least eighteen months, even though the fluid becomes normal before this time. With continuous treatment until the fluid is normal, the prognosis is excellent and future parenchymatous neurosyphilis should not develop. But if adequate treatment is not given, the possibility of more serious latent syphilis of the nervous system is great[5] (Table 3).

Table 3. *Effect of Treatment in the Ultimate Outcome in Syphilitic Meningitis.*[5]

Type of Treatment	Ultimate Outcome	
	good	poor
	%	%
Adequate	86	14
Poor	33	67

Early Vascular Neurosyphilis

Cerebral Lesions

The blood vessels of the brain may be involved early in the course of syphilis, but the occurrence of vascular accidents in the first few years of the disease is rare. The vascular lesions in early neurosyphilis are usually accompanied by a moderate or severe degree of meningeal reaction, in contrast to those which occur late in the disease, where the meningeal element may be almost or entirely lacking. The symptoms of early vascular syphilis of the brain are those of vascular disease in general. Since meningitis is usually a concomitant factor, many of these patients complain of headaches for several days or weeks before the onset of the vascular insult. With thrombosis — the lesion that produces symptoms — there may be convulsions, coma and neurologic residuals, depending on the site of the vessel thrombosed. Since the middle cerebral artery is the one most commonly involved, the symptoms are usually those of a hemiplegia or a hemianesthesia. Other neurologic syndromes such as aphasia, hemianopia and those due to lesions of the brain stem also may result from vascular occlusions in early syphilis of the blood vessels. The treatment is essentially similar to that outlined for meningeal neurosyphilis. The prognosis in regard to life is good, since these lesions are rarely fatal, but that in regard to return of function of disabled members is more complicated, and is dependent chiefly on the size of the vessel thrombosed and on whether this vessel actually nourished a vital area. Treatment is directed mainly toward the prevention of future vascular lesions or parenchymatous neurosyphilis. The treatment itself cannot be expected to affect the softening of the brain that has resulted from the vascular occlusion.

The following cases illustrate different types of cerebral lesions. In Case 4, there was early cerebral vascular neurosyphilis with a marked degree of meningitis, and in Case 5, early meningeal and vascular syphilis of the cord was followed by cerebral lesions.

Case 4. T. H., a 30-year-old sailor, was admitted to the hospital in 1933 with a right hemiplegia which had developed during sleep the night before. He had complained of headaches for the last few weeks. On examination there was a generalized secondary rash and a right hemiplegia involving the face and the right arm and leg. The blood Kahn test was positive. The cerebrospinal fluid contained 700 lymphocytes per cubic millimeter; the colloidal-gold curve was 5555441100, and the Wassermann reaction positive. The patient was treated with neosalvarsan and bismuth. The hemiplegia improved rapidly, and he was discharged, with instructions to return to the Out-Patient Department for further treatment.

Case 5. C. McD., a 26-year-old laborer, was admitted to the hospital on June 14, 1929, complaining of difficulty in walking. Three and a half months previously he had had a penile chancre, which was followed by a secondary rash and iritis. Six days before entry there was numbness and weakness of the legs, which increased in severity.

On examination there was a fading secondary rash, generalized adenopathy and acute iritis. There was a spastic weakness of both legs, with knee and ankle clonus and bilateral Babinski reflexes. Sensation was well preserved. The blood Kahn test was positive. The cerebrospinal fluid was under normal pressure; it contained 80 white cells per cubic millimeter and 120 mg. of protein per 100 cc.; the colloidal-gold curve was 1112222210 and the Wassermann reaction was positive. The patient was given seven injections of arsphenamine, 0.4 gm. each, with rapid improvement in the strength of the legs, and was discharged on July 19, to receive further treatment in the Out-Patient Department. He visited the department only four times in the next 9 months and was readmitted to the hospital on April 25, 1930, with a paralysis of the left arm and leg, which had developed suddenly the day before entry. The cerebrospinal fluid contained 80 white cells per cubic millimeter and 105 mg. of protein per 100 cc.; the colloidal-gold curve was 4443333210, and the Wassermann reaction was positive in 0.1 cc. of fluid. He remained in the hospital 1 week, during which time the hemiplegia rapidly improved. He received continuous treatment in the Out-Patient Department for the next 2½ years with neosalvarsan, Tryparsamide and bismuth. At the end of this time he was symptom-free and examination was negative except for hyperactive reflexes in the legs and a slight diminution of vibratory sense in the tibia. The blood Hinton test remained positive, but the cerebrospinal fluid was entirely normal.

Spinal Lesions

In early neurosyphilis of the spinal cord there is usually an admixture of meningeal and vascular involvement (meningomyelitis). When the meningeal involvement predominates the symptoms are those of a mild spinal myelitis, with stiffness of the legs, weakness, hyperactive reflexes and Babinski's sign (Case 5). With extension of the involvement to the blood vessels the lesions in the cord are much more extensive and there may be a complete transverse myelitis with a flaccid paraplegia, complete loss of sensation and areflexia (Case 6). The signs of meningeal involvement usually precede those of vascular disease, and if treatment is initiated at this stage, progress of the disease to the blood vessels can usually, but not always, be prevented. When the weakness is accompanied by spasticity the results of treatment are usually quite encouraging, but once a flaccid paralysis with complete loss of sensation has developed there is little chance of any return of function in the legs, and death often ensues from the development of bed sores or ascending urinary infection. The following case is one of early syphilitic meningomyelitis, with thrombosis of the spinal vessels.

Case 6. M. F., a 45-year-old man, was admitted to the hospital on February 11, 1929, with complete paralysis of both lower extremities of 6 days' duration. Twelve months previously he had had a chancre on the index finger, and 10 months previously a generalized rash and sore throat. Three months before entry there had been a transient weakness of the legs, which left him with a limp and with imperfect control of urination.

On examination there was a flaccid paraplegia with complete anesthesia below the 4th lumbar segment and hypesthesia below the level of the 6th dorsal segment. There was rectal and vesical incontinence. The ankle jerks were absent, and the knee jerks were feeble. The blood Kahn test was positive. The cerebrospinal fluid was under normal pressure. It contained 108 white cells per cubic millimeter and 129 mg. of protein per 100 cc.; the colloidal-gold curve was 5555432110, and the Wassermann reaction was positive. The patient remained in the hospital for 6 weeks, during which time he was treated intensively with neosalvarsan, iodides and mercury. There was no improvement in the paralysis or sensory loss. He developed an extensive decubitus and died of septicemia.

Summary

Laboratory evidence of involvement of the central nervous system can be found in approximately 40 per cent of the patients with untreated syphilis if the cerebrospinal fluid is examined in the first few months following the appearance of the secondary rash. Clinical symptoms or signs of this involvement are rare, and the significance of the abnormalities in the fluid at this stage lies in the fact that they indicate that serious late syphilis of the nervous system — dementia paralytica or tabes dorsalis — is apt to develop unless proper treatment is given. For this reason the cerebrospinal fluid should be examined in all patients with syphilis. It has been recommended[6] that a patient undergoing treatment for early syphilis should have an examination of the cerebrospinal fluid after six months of treatment and again at about eighteen months, or on completion of treatment. It is not always practicable to puncture the patient twice, and in such cases the puncture should be performed at the latter time. No patient should be discharged from treatment as cured until the cerebrospinal fluid has been examined

and found to be entirely normal regardless of the results of the serologic tests on the blood.

The treatment of patients with asymptomatic or symptomatic involvement of the nervous system in early syphilis is essentially the same as that for early syphilis in general, namely, trivalent arsenicals, bismuth or mercury, and iodides. Treatment must be continued, however, until the cerebrospinal fluid is entirely normal. If this is not accomplished by eighteen months to two years of routine treatment, the further treatment should be modified to include the use of Tryparsamide and, if necessary, artificial-fever therapy.

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THE PUBLIC-HEALTH ASPECTS OF SYPHILIS AS IT CONCERNS THE GENERAL PRACTITIONER

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FOR nearly fifty years Massachusetts has been a leader among the states in recognizing the venereal diseases as a problem of public health. Legislation in regard to venereal disease in Massachusetts dates back to 1894. The first state-supported Wassermann laboratory opened here in 1915. In 1918 Massachusetts became the first state to supply arsphenamine free to physicians, clinics and institutions treating syphilis.

During the current nationwide program for the control of venereal disease this commonwealth is again in the front ranks. For the fiscal year 1940 Massachusetts has available for venereal-disease control from all sources 10.2 cents per capita, of which state and local appropriations amount to 7.7 cents. This is about 3 cents more than the average per capita state and local contribution for the country as a whole.

Confidently we can affirm that Massachusetts' newly enacted prenatal law will tend to reduce congenital syphilis to the vanishing point. Through twenty years of relentless war against syphilis, the English have pushed down their rate of infant mortality due to this disease from 20 per 10,000 live births in 1917 to 2 per 10,000 in 1938.[1] Even indirect control measures such as a premarital-blood-test law has an immediate effect measured in declining congenital syphilis rates. For example, the premarital law of your good neighbor, Connecticut, has been on the books for only four years. Yet in thirty-six months the number of reported cases of congenital syphilis in infants has dropped from 38 in 1936 to 16 in 1938—and only 7 cases were reported for the first six months of 1939.[2] Yes; congenital syphilis disappears before determined attack.

The already excellent serological laboratories of Massachusetts are constantly striving for higher efficiency. Well-trained epidemiologists and follow-up workers are available to each of you through the State Department of Health.

But state action alone—no matter how abundant or necessary—cannot wipe out syphilis. This is not a problem of catching rats or testing water. This is a human problem. Finding and treating syphilis strike at the intimate life of the individual. The patient immediately raises natural and artificial barriers—the physician alone is capable of breaking through them.

However, before we consider what the practitioner can do for the control of venereal disease, let us think briefly about what such control may mean to the practitioner. About four years ago a survey was conducted by the United States Public Health Service in Richmond, Virginia, concerning the economic factors underlying the control of syphilis.[3] At that time nearly one third of all private patients with venereal disease were being treated by private physicians with little hope of remuneration. Although many of these patients could afford to pay—and did pay—for most of their medical requirements, the extended treatment for syphilis was beyond their means. From any viewpoint, such an arrangement is unfair to the physician. Why should his services be demanded for public charges without compensation? Regardless of good intentions, the relatively small body of physicians cannot shoulder a responsibility that rightfully belongs to society as a whole. With a well-equipped, tax-supported clinic at hand this

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concentrated burden is lifted from the physician. Ample experience indicates that the public venereal-disease clinic is the economical method of treating the patient who cannot afford private care.

Unfortunately, the economic status of the individual is invariably reflected in the economic status of the community. Communities in which a large proportion of individuals cannot afford treatment for syphilis are themselves unable to afford adequate medical care for these individuals. It is doubtless true that poor communities need health services more than do the wealthy. Congress has kept this in mind when directing that federal funds for venereal-disease control shall be provided on the basis of financial need as well as upon extent of the problem.

For example, it is estimated that over 60 per cent of all persons infected with venereal disease in the United States are concentrated in seventeen Southern states, which have the lowest per capita income. From the standpoint of venereal-disease control, it is highly significant that these same states contribute most to the rising stream of interstate migration. The problem of venereal-disease control cannot be isolated to a particular geographic region. It is a problem for the nation and must be attacked on a nationwide basis. Some areas — Massachusetts is such an area — are capable of conducting an adequate local control program. Other areas require outside help.

The establishment of clinics providing part-pay or free treatment for indigents is attended, of course, by many dangers. Recently there was brought to my attention a confidential report prepared by a medical man highly respected in his own community, in which he points out the dangers which arise when the county medical society exclusively dictates how, by whom and to whom clinic care is to be given. This policy reaches the heights of absurdity, he states, in one area where fourteen local physicians, largely older men, wish to serve in the clinic, presumably for the small financial return. They rotate in service, each attending the clinic for two weeks at a time.

How can there be uniformity of service under such conditions? None of these physicians are trained; some will never be able to master the technics of treatment; and no one of them has that responsibility for overseeing the whole which will enable him to develop and enlarge the service. This is not venereal-disease control, but it does tend to discredit the vast majority of physicians who are trying to make such control a reality.

It has been argued that such experience makes better physicians of these doctors, in their private practice. In my opinion, a public clinic is established to provide adequate and economical diagnosis and treatment to a section of the population unable to provide for themselves. While it is available for observation and training, it is not primarily an educational institution. I am happy to see that you in Massachusetts are approaching the problem of physician-training in the treatment and control of venereal disease in a more effective manner — through a training program jointly sponsored by the Massachusetts Medical Society and the Massachusetts Department of Public Health.

On two occasions, during the spring of 1937 and the corresponding months of 1939, surveys were conducted to determine the constant syphilis-treatment load in Chicago. All clinics and all but twenty of six thousand Chicago physicians participated. In the intervening two years, an extensive venereal-disease educational program had been begun. At the time of the second survey, the early-syphilis-treatment load in the clinic increased about one third. This load among private practitioners had increased by an almost identical percentage.[4, 5] Present-day education seems to have brought new cases to the physician from the middle-income group — a group able to purchase most of its medical care.

Education not only tends to bring more infected persons under treatment; it also helps the physician in case-holding. It shifts the burden of proof from him in making a diagnosis. It makes the prenatal blood test easier to take. It permits him to include examination for venereal disease as a routine part of his clinical procedure.

Well-organized syphilis control implies good epidemiology and follow-up service. When the program provides it, the practitioner can make good use of case follow-up. For example, the State of Illinois has a trained venereal disease follow-up staff.[6] In 1939, private physicians reported 937 delinquent patients to the venereal-disease control officer; of these, 552 (59 per cent) were returned to treatment. The same physicians reported 878 suspected contacts by name; of these, 331 (38 per cent) were located, examined, found infected and placed under treatment. In 2486 contact investigations started on newly reported cases, treating physicians failed to co-operate with the state investigator in only 82 cases. This is a remarkable tribute to co-operative effort. Illinois physicians have found that an intelligent investigating service is worth while. When both the state and the physician share the responsibility, syphilis control becomes a reality.

Despite its doubtful reputation, we know that syphilis is not confined altogether to the poor and criminal classes; yet we may hesitate to suspect an

infection in our well-to-do patients. Detection of syphilis requires unceasing vigilance.

Early syphilis — primary, secondary and latent within four years of infection — can almost be said to be the special province of the private practitioner. He sees more patients with early syphilis than does the expert or the specialized clinic or institution. Patients do not come to be treated for syphilis. They come because of a persistent sore or falling hair or sore throat or skin rash. The physician must find syphilis. There is no reason why the eye, nose and throat specialist, for example, should treat syphilis if he does not want to. But he should be able to recognize syphilitic mucous patches in the mouth for what they are. He should be able at least to suspect that this present case of iritis may have a syphilitic origin.

While speaking of diagnosis, may I point out that the prenatal law only codifies a fact that obstetricians have accepted for the past decade? Syphilis in the pregnant woman should be discovered and treatment begun early in pregnancy. Possibility of a disastrous outcome increases with every week of delay. Conversely, every week of treatment makes more certain the delivery of a presumably nonsyphilitic, living child. Although the first test may prove negative, good practice demands that a follow-up test shall be taken later, preferably around the seventh month of pregnancy.

After the diagnosis of early syphilis has been established, it is largely up to the practitioner to bring about an outcome favorable for the patient and at the same time to fulfill his obligation to the community health. The physician is responsible; first, for complete instructions to the patient concerning the disease, its probable complications without adequate treatment and his chances for recovery; secondly, for instructions to the patients concerning marriage and procreation, and the constant danger of infection, due to mucocutaneous relapse; thirdly, for reporting to health authorities and co-operating with them on epidemiology and recalcitrant patients; and fourthly, for giving adequate and sufficient treatment properly administered, after he has assumed the responsibility of treating a case of syphilis.

Deservedly proud is the practitioner of the splendid patient-physician relation he has maintained. Nevertheless, the first several interviews with a syphilis patient will demand his utmost resources in persuasive power, tact and understanding. The patient must be made to realize the significance of his infection. He should realize that his chance for recovery — excellent in early syphilis — depends on faithful and constant attendance. The danger of short-course, inadequate and catch-as-catch-can treatment should be brought home to him.

In my opinion, the patient who will willfully expose others to infection from syphilis is rare, once he thoroughly understands the infectious nature of the disease. It is not enough to warn him against intimate sexual relations. Extragenital lesions are often fully as contagious, and the patient should be forewarned so that he may be on guard for possible mucocutaneous relapse. It takes courage to undergo fifteen or eighteen months of treatment, and the physician is required to help the patient complete the entire regime. Finally, the patient should have a thorough understanding of the probable costs of treatment, with a plan for their settlement.

The practitioner, of course, is not a credit bureau, as is realized by most of you who leaf through last year's unpaid accounts. In the matter of determining whether or not a patient has ability to pay, the doctor as a rule has little guidance. He could get credit reports just as do the department stores, but physicians simply do not run their affairs in that manner. They are poor business men. Nevertheless, the treatment of syphilis cannot be — as the reimbursement too often is — a haphazard affair.

No physician should undertake a case of syphilis until he has discussed with the patient the probable costs of adequate arsphenamine and bismuth treatment and worked out a method of payment satisfactory to both patient and doctor. If a satisfactory arrangement is not available, the physician has a positive obligation to refer the patient to a part-pay or free treatment center. Do not accept the responsibility of treating a case of early syphilis, unless you also accept the responsibility to see the patient through to adequate treatment.

Each patient diagnosed as having early syphilis is but one link in a chain of infection. When such a patient comes to him for treatment, the practitioner has an opportunity to break the chain. Adequate treatment will render the patient noninfectious, and hence break the chain, but adequate treatment implies a non-lapsing patient. Since the physician has neither legal authority nor professional sanction to follow the case, he must depend largely on public investigators for follow-up of delinquent patients. When the delinquent is suffering from possibly infectious syphilis, inadequately treated, the practitioner is obligated to notify health authorities at once.

The private doctor also needs assistance in tracing contacts for examination and treatment. Obtaining the names of possible sources may be delicate work, especially when marital contacts are involved. That it is not an insurmountable difficulty, however, is indicated by the success many doctors have had for years in getting epidemiolog-

ical data. Some authorities hold that the patient himself offers the best opportunity for approaching the contact.[7] Others insist that the patient should rarely be required to do epidemiology on his own contacts. It is usually less embarrassing for him, they say, and more acceptable to the contact to have the job done by a sympathetic, intelligent investigator.[8] Excellent case-finding has been accomplished by both groups.

Throughout, I have taken pains to emphasize the necessity of a close working agreement between physician and health department, especially in the matter of case-holding and case-finding. Let me quote the findings of a recent survey conducted in the District of Columbia which tells this story in another way. A fair proportion (40 per cent) of private patients in Washington receive satisfactory treatment from the standpoint of adequacy and continuity—considerably more than among clinic patients of the city. On the other hand, three fourths of the clinic patients continue their treatment for at least six months or longer, while more than half the private patients drop out before the sixth month of treatment.[9] A major point in this difference lies in the fact that clinics are routinely using health-department epidemiology service, while physicians have not yet taken full advantage of these facilities.

We have grown accustomed to look to other nations for evidence that syphilis can be controlled as a major menace to the public health. I look forward to the day when we can fashion our story with facts from this country. It is not far distant.

There is evidence that the general venereal-disease program is showing progress beyond our most optimistic anticipations. We can measure this progress in several respects. Previously, I have stressed the need for greater diagnostic alertness. During the last two years a twofold increase is shown in the number of serologic tests for syphilis made throughout the United States. Serologic tests from nonclinic sources, which include tests made by private physicians, jumped from less than two million in 1936–1937 to more than three and a half million in 1938–1939.

It seems that a maximum limit in the number of new infections from syphilis each year has been reached. Despite the fact that more physicians than ever are reporting cases, the number so reported by doctors has increased but slightly in the two-year period. An increase in the amount of arsenicals used, therefore, must largely result from the fact that patients are remaining under treatment for a longer period of time. The number of doses of arsenicals distributed to treating physicians and clinics by the states was three times as large during the past year as the number distributed two years before. In 1936-1937 private physicians received without charge about four hundred thousand doses; in 1938-1939 this group received over one and a half million doses. Altogether in 1939 drug houses report domestic sales of arsphenamines totaling nearly twelve and a half million doses.

In those areas known to have had a syphilis-control program in operation over a period of years, there are indications that existing preventive and control measures have been effective. For example, the annual first admissions for paresis to state institutions for mental diseases in Massachusetts, New York and Minnesota show a slow but constant decline since 1920. In Wisconsin, the results of tests made under the premarital examination laws indicate that the prevalence of syphilis is but half as high as in other states with similar laws. Ten years ago, in Macon County, Alabama, the syphilis rate as shown by positive blood tests reached a point presumably near saturation. After several years of demonstration and control, the rate dropped from 38 to 18 per cent. Upstate New York shows a decline in early syphilis from 37.9 per 100,000 population in 1936 to 17.6 in 1939, and a decline in the total rate from 305 in 1936 to 232.4 in 1939.

Doctor Nels A. Nelson has recently compiled statistics on syphilis case-reporting for Massachusetts during the decade 1930-1939. He assures me that increasingly more physicians are reporting, in view of which his results are very encouraging. From 1930 to 1937 the total number of reported cases in all forms rose from 4200 to 6200. Since 1937 the trend has been downward. In 1939 the rate was 20 per cent below the peak year, a highly significant difference. The figures on early syphilis alone are still more encouraging. For the ten-year period there has been a steady decline from a rate of 36 per 100,000 population in 1930 to 27 in 1937 and to 14 in 1939—a drop in ten years of 60 per cent.

Today we stand aghast at the darkness of war and hate throughout the world. We, too, are a generation born to fight; but, pray God, let us fight the enemies of humanity. Syphilis with its tragic human waste and enormous cost is such an enemy. We know that it can be controlled.

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NON-SURGICAL CONDITIONS SIMULATING ACUTE APPENDICITIS IN CHILDREN*

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THERE are many nonsurgical conditions that closely simulate acute appendicitis in children. In this paper 9 of the more interesting cases of this sort that have recently been observed at the Children's Hospital are presented. In each case some member of the surgical staff seriously entertained the diagnosis of appendicitis; in a few, operation was actually performed. But in all cases the cause of the symptoms, in the broadest sense, lay outside of the peritoneal cavity.

There is an equally interesting group of cases representing surgical conditions simulating appendicitis[1, 2]; but since these, like appendicitis, require operative treatment, and as their differential diagnosis has been frequently emphasized, they will not be discussed here. Discussion of such familiar differential considerations as mesenteric adenitis, pyelonephritis, gastroenteritis and chronic constipation is likewise omitted.

The following list represents the correct diagnoses for the cases under discussion: Typhoid fever, measles, migraine, diabetic acidosis, allergic gastroenteritis, rheumatic fever, lobar pneumonia, sickle-cell anemia and leukemia.

CASE REPORTS

CASE 1. R. S., a 7-year-old Negro, was admitted to the Medical Service of the Children's Hospital on June 26, 1939, because of fever and abdominal pain of 7 days' duration. He was constipated and had not vomited. The pain at first had been umbilical, but for the 48 hours before entry it had been localized in the right lower quadrant. The temperature was 102°F. and the pulse 128. Physical examination showed localized tenderness and involuntary spasm in the right lower quadrant, with some less marked, generalized abdominal tenderness. Rectal examination showed tenderness on the right. The urine and stool examinations were normal. There was no evidence of shock or loss of blood. The white-cell count was 7400, with 73 per cent polymorphonuclears. Surgical consultants on the night of admission found the same physical signs, and after careful consideration decided that the possibility of an acute appendix was great enough to warrant exploration. As the operating room was being prepared, a positive Widal test was reported. Operation was postponed. The Widal test was verified, and *Eberthella typhosa* was cultured from the blood. The subsequent course was that of satisfactorily treated typhoid fever.

CASE 2. R. H., a 7-year-old boy, was admitted to the Children's Hospital on July 1, 1935, because of abdominal pain and nausea of 48 hours' duration. The pain was intermittent and was localized near the umbilicus. The day of admission he vomited. Three years previously he had had a similar attack that subsided spontaneously. At the time of admission he showed localized tenderness, without spasm, in the right lower quadrant. The white-cell count was 7600, with 65 per cent polymorphonuclears. The urine was normal. Although the findings were atypical, they were suggestive enough to warrant hospital observation. The next morning the patient had unmistakable measles. He was transferred to a hospital for contagious diseases, where abdominal signs promptly disappeared and did not recur.

CASE 3. P. W., a 9-year-old girl, was admitted to the Surgical Service on November 12, 1933, because of recurrent attacks of pain in the right lower quadrant and vomiting; the attacks had come with increasing frequency during the last year, and had required one previous hospital admission and many outpatient observations. Most of the attacks were accompanied by headache, usually on the left side. The physical examination was always negative save for minimal tenderness in the right lower quadrant. The white-cell counts were consistently around 9000 and the temperature was 100°F. Barium x-ray examination of the large and small bowel, an intravenous pyelogram, a cholecystogram and films of the skull were normal. The patient's mother had for years had similar symptoms, for the ineffectual relief of which a normal gall bladder and appendix had been removed at separate operations. Although the patient had been admitted for appendectomy, it was thought that migraine was the correct diagnosis. Operation was postponed. Under medical care the child improved.

CASE 4. M. M., an 11-year-old girl with recognized diabetes, was admitted to the Children's Hospital on September 20, 1938, because of right-sided abdominal pain of 6 hours' duration. The day before she had been nauseated; she had vomited several times on the day of admission, and was constipated. The pain was severe, had increased steadily and was localized to the right lower quadrant. She had had a series of eye infections (hordeola) during the previous week. In spite of the regular dose of 16 units of protamine insulin and 16 units of regular insulin daily,

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the urine had showed considerable amounts (orange) of reducing substance for 4 days. The significant physical findings were a temperature of 101°F., deep respirations, flushed face, drowsy reactions, two hordeola in the right upper eyelid, acutely localized tenderness and involuntary spasm during superficial and deep palpation of the right lower quadrant of the abdomen and tenderness and spasm in that quadrant during rectal examination. The white-cell count was 24,000, with 83 per cent polymorphonuclears; the red-cell count was 5,470,000, and the hemoglobin was 110 per cent (Sahli) or 17.1 gm. per 100 cc. The urine contained large amounts of reducing substances and acetone. The blood-sugar level was 702 mg. per 100 cc. Appendicitis was seriously considered as the cause of the obvious acidosis. However, within 3 hours after an enema, a gastric lavage and the starting of a continuous intravenous drip (10 per cent glucose, normal saline and sodium lactate) the abdominal tenderness and spasm had disappeared. Within 10 hours the blood-sugar level was 200 mg. per 100 cc., there was no acetone in the urine, and the child was alertly taking fluids by mouth without vomiting. Her subsequent recovery from the diabetic acidosis was uneventful. There was no return of abdominal symptoms.

Case 5. C. W., an 11-year-old girl, was admitted to the Surgical Service of the Children's Hospital on November 9, 1939, because of abdominal pain of 30 hours' duration. The pain was severe and limited to the periumbilical region. She vomited twice during the 12 hours preceding admission. The significant physical findings were a temperature of 100°F., a flushed face and tenderness with minimal involuntary spasm in the right lower quadrant of the abdomen. Right-sided tenderness was exhibited during rectal examination. The white-cell count was 10,000, with 82 per cent polymorphonuclears. With a preoperative diagnosis of acute appendicitis, an exploratory laparotomy was done the night of admission. Nothing of significance was found. There were no enlarged lymph nodes, Meckel's diverticulum or abnormality of the ovaries. A normal appendix was removed. On the second postoperative day the patient had an exact repetition of the presenting illness, this time accompanied by a generalized urticaria. An x-ray film of the abdomen at this time showed no signs of obstruction. The pain, urticaria and vomiting were all promptly relieved by a subcutaneous injection of adrenalin. Eighteen hours later the abdominal pain and urticaria returned and were again relieved by adrenalin. During the next 3 days the percentage of eosinophils in the circulating white blood cells rose to 14 per cent (5400 total white-cell count, with 54 per cent polymorphonuclears). On a regime of ephedrine sulfate no more attacks occurred and the eosinophils fell to 6 per cent during the next 4 days. The child had a history of asthmatic attacks in late infancy; the mother had had urticaria several times. Convalescence was uneventful. The patient is now under the care of the Anaphylactic Clinic. We believe that the whole episode was due to an allergic gastroenteritis.

Case 6. P. L., a 9-year-old girl, was admitted to the Surgical Service of the Children's Hospital on February 17, 1938, because of abdominal pain and vomiting of 24 hours' duration. She had experienced a similar attack 2 weeks previously, which lasted 2 days; in the interim she had felt listless and complained of occasional headaches. The significant physical findings on admission were a temperature of 104°F., a pulse of 140, sharply localized tenderness in the right lower quadrant and involuntary spasm over the lower abdomen. Rectal examination showed tenderness in the right lower quadrant. There was no involvement of any joint. The pharynx was injected. The heart was enlarged to the left, and apical systolic and mid-diastolic murmurs were heard. The white-cell count was 26,800, with 82 per cent polymorphonuclears. The urine was normal. A laparotomy was done on the night of admission, with a preoperative diagnosis of acute appendicitis and localized peritonitis, plus rheumatic heart disease. The appendix was normal under gross and microscopic examination. No intraperitoneal abnormality was found. Although convalescence from the operation itself was uneventful, the child remained ill, with a high white-cell count, exacerbation of the heart signs and a return of abdominal symptoms, this time on the left. Subsidence came gradually with bed rest. In retrospect, the whole episode is regarded as an exacerbation of acute rheumatic fever.

Case 7. F. B., a 7-year-old girl, was admitted to the Surgical Service of the Children's Hospital on February 12, 1936, because of right-sided abdominal pain and vomiting of 5 days' duration. She had had four similar attacks during the previous year. She had had a cold for 3 weeks before admission. Her physician believed that she had appendicitis and sent her to the hospital for operation. When first seen, she was lying on her back with the right thigh flexed; passive extension of the right leg caused abdominal pain. There was tenderness all over the right side of the abdomen, with involuntary spasm in the right upper quadrant. The rectal examination was normal. The right side of the chest did not move so freely with respiration as did the left. The temperature was 103°F., and the respirations 28. The white-cell count was 26,000, with 85 per cent polymorphonuclears. Because of the splinting of the diaphragm and absence of spasm in the right lower quadrant, it was decided not to operate immediately. A few hours after entry the respirations were 38 and the breath sounds at the right base were suppressed. X-ray films verified the clinical impression of pneumonic infiltration involving the right lower lobe. Her subsequent course was that of a satisfactory recovery from lobar pneumonia.

Case 8. C. M., an 18-month-old Negress, was admitted to the Children's Hospital on December 27, 1926, because of abdominal pain of 2 days' duration. She had been apathetic for 1 week. There had been no vomiting, constipation or genitourinary symptoms. The significant physical findings were irritability, a temperature of 101°F., pale mucous membranes, generalized abdominal tenderness without spasm, a large spleen and a large heart with a loud apical systolic murmur. The blood Wassermann test was negative. The white-cell count was 28,200, with 62 per cent polymorphonuclears. The hemoglobin was 25 per cent, and the red-cell count was 1,240,000; the red blood cells showed achromia, variation in size and shape, and sickling. The child responded well to transfusions. She has been closely followed by the Medical Service ever since. She has had occasional mild attacks of abdominal pain, but always accompanied by other manifestations, such as an abrupt fall in red-cell count, hematuria, headaches, apathy, fever and leukocytosis, of a crisis in her disease, which is believed to be sickle-cell anemia.

Case 9. W. F., a 5-year-old white boy, was admitted to the Children's Hospital on April 10, 1938, because of abdominal pain of 12 hours' duration. He had been healthy heretofore. The pain had been sudden in onset; it had begun in the umbilical region and settled in the right lower quadrant. He had experienced nausea without

vomiting. The temperature was 100.6°F. There was tenderness and involuntary spasm in the right lower quadrant and a slight generalized enlargement of the lymph nodes. The first white-cell count was 14,000; 6 hours later it was 20,000. On each occasion 90 per cent of the cells were lymphocytes, some of them young forms. It was thought that the patient had appendicitis, acute lymphatic leukemia or both. At exploration on the day of admission an apparently normal appendix was removed. There was no Meckel's diverticulum. Microscopic study of the appendix showed no inflammation but multiple areas of lymphoblastic infiltration in the mucosa. Biopsied lymph nodes were typical of acute lymphatic leukemia; and when, a few months later, the patient died, the chief findings at autopsy were those of this disease.

Discussion

The clinical signs or laboratory hints that might lead a surgeon to make any of these nonsurgical diagnoses are for the most part familiar. The word "surgeon" rather than "physician" is used intentionally, because in cases where the resemblance to appendicitis is so striking the final decision should be made by the man most familiar with acute abdominal disease. It may be helpful to reiterate certain differential features.

With the exception of pneumonia, pyelonephritis and mesenteric adenitis, most of the nonsurgical conditions simulating appendicitis are associated with a low white-cell count. The most dangerous corollary to draw from such a statement would be that the finding of leukopenia eliminates the possibility of appendicitis. Leukopenia can and does accompany acute appendicitis, but it is not usual. A second white-cell count two or three hours after the initial observation may clarify the situation. It is perhaps worth remembering that leukopenia can be created, even in the presence of an acute condition of the abdomen, by the indiscriminate use of sulfanilamide.

The presence of Koplik spots, leukopenia or a history of exposure may suggest the diagnosis of measles; moreover, it is unusual for uncomplicated measles to cause real involuntary spasm in the right lower quadrant. Yet no matter what precautions are taken, at least once a year measles rears its blotchy head on one of the surgical wards at the Children's Hospital. During the quarantine that follows the staff members try to be stoical by remembering that measles and appendicitis may occur simultaneously, and that some pathologists[3] have actually found toxic changes in the appendices of patients with measles which they believe are characteristic of the latter disease. When measles and appendicitis occur simultaneously, the surgical attitude and treatment should be exactly as if the case were one of simple appendicitis; from the patient's point of view, the risk of an unnecessary operation is less than the danger of a missed diagnosis.

Mention of typhoid fever and the allied group of dysenteries brings up the vexing question of how seriously one must consider the symptom of diarrhea. Cases of diarrhea with early peritonitis, appendiceal abscess or even a simple unruptured inflamed appendix overlain by an unusually mobile portion of the sigmoid are relatively common.[4] When diarrhea is a symptom, a low white-cell count may be very helpful; for the presence of leukopenia and diarrhea in the same patient would militate strongly, though not infallibly, against appendicitis. Ill-advised catharsis or an overwhelming sepsis could of course upset this dictum.

Headache is rarely associated with appendicitis.[3] Migraine is but one of a group of diseases whose abdominal manifestations, in children, at least, are linked with headaches and even dominated by them; such illnesses are meningitis, poliomyelitis, lead poisoning, infectious mononucleosis, influenza, rheumatic fever and the prodromal stages of a number of exanthematous diseases.

Several times a year a decision has to be made as to whether one of the known diabetic children has appendicitis with acidosis, or severe ketosis due to some other cause. Although constipation is often a factor, it is not clear why acidosis should cause such vivid signs[5] in the right lower quadrant. Nor is this phenomenon limited to diabetic children alone. Experience has taught that the apparently acute abdominal signs in a vomiting, dehydrated child may become completely normal an hour or so after a good enema and adequate treatment with parenteral fluids.

There apparently is such a thing as allergic gastroenteritis, although it is difficult to assemble a pathologic syndrome that has been consistently observed at operation. Edema of the mesenteric lymph nodes has been noted; microscopic sections of the appendices occasionally, as in Case 5, have shown toxic changes in the lymphoid follicles. The evidence, however, is chiefly empirical. An adequate history often suggests the diagnosis. There are usually an increased number of eosinophils in the circulating blood, without much actual increase in the total leukocyte count. A small (0.2-cc.) subcutaneous injection of adrenalin relieves the signs and symptoms in a significant portion of the cases. The trouble ceases when the offending element can be found and avoided.

Abdominal pain is often a symptom in the early stages of rheumatic fever. The mistake in Case 6, if mistake it was, would undoubtedly be made

again should the same conditions be combined in another patient. Usually the tenderness is not so persistent nor the spasm so clearly defined, and a short period of observation may bring clarification as the true disease delineates itself.

Cases in which pleural irritation causes confusion (lobar pneumonia, pleurodynia and pleurisy) are particularly difficult because the deception is related to the anatomic phenomenon of referred pain. As Capps[6] and others have shown, pleural and peritoneal pain may be carried over closely allied neurologic mechanisms. So there may be actual involuntary spasm in the right lower quadrant that in reality arises from a stimulus in the pleura. Often such spasm is intensified by deep breathing, coughing or laughing, phenomena that ordinarily do not affect genuine signs in the right lower quadrant except possibly to encourage maximal relaxation.[1] Usually the febrile reaction (fever, leukocytosis and evidences of toxicity) is greater in pneumonia than in appendicitis; only when the appendix has ruptured does this aspect become similar in the two diseases. Because early pneumonia in children frequently cannot be detected by physical examination, the chest should be examined fluoroscopically in all doubtful cases.

The blood dyscrasias are represented in this group by sickle-cell anemia and leukemia. The so-called "crisis" of sickle-cell anemia has been notorious for its simulation of surgical conditions, chiefly appendicitis and osteomyelitis.[7] In Southern clinics where 5 per cent of the Negroes normally have sickling of the red blood cells, this constitutes an even more complicated problem. The diagnosis is made by recognition and study of the anemia, including direct observation of the abnormal cells in a thin, fresh, unstained smear prepared as for a differential cell count.

In recent years, several children have been seen with leukemic invasion of the appendix, unattended by inflammation but closely simulating appendicitis. Clinical signs, such as purpuric areas, bleeding gums and emaciation, provided the initial clues; the presence of abnormal white blood cells and a reduced number of platelets in the smear added further evidence. Closely allied to this diagnosis is that of purpura of any origin; through hemorrhage in or around the appendix it may simulate an acute inflammatory process. The embarrassment awaiting the surgeon who operates on a child with an unrecognized bleeding tendency needs no emphasis.

Conclusions

It is interesting to review a group of nonsurgical cases simulating acute appendicitis in children. It is also a little dangerous. For, with a few exceptions, they represent differential considerations seldom encountered in daily practice. Certainly it is true that most of the children who are thought to have acute appendicitis really have it. Leukopenia, diarrhea and headaches can be deceptive if considered too seriously. Involuntary spasm in the right lower quadrant demands hospitalization, if not operation, no matter how many unusual diagnoses suggest themselves.

It is not the purpose of this discussion to cause any confusion. Opening the peritoneal cavity, however, is still attended by a significant mortality, and it is possible to sharpen one's diagnostic acumen without violating the sanctum of surgical judgment.

Summary

Cases of certain nonsurgical diseases, the symptoms and signs of which closely simulated those of acute appendicitis, are presented. The diseases discussed are typhoid fever, measles, migraine, diabetic acidosis, allergic gastroenteritis, rheumatic fever, lobar pneumonia, sickle-cell anemia and leukemia.

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CLINICAL NOTE

A CERVICAL-SPINE BRACE WHICH REDUCES THE USE OF PLASTER CASTS

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THE cervical-spine injuries seen on the Neurosurgical Service at the Boston City Hospital are all associated with injury to the spinal cord. This condition necessarily modifies the handling of the patients, for the presence of cord damage usually implies enough dislocation to cause pinching of the cord, which is apt to mean that there is extensive ligamentous damage. Such dislocation, whether or not it is still present at the time of admission to the hospital, is prone to recur after the patient is up and about unless there is adequate external support for the neck.

Whatever type of treatment is given the patient during the early, acute stage of his course, flexion must be prevented because flexion invites further dislocation. In addition, one must apply traction to the neck to reduce any remaining dislocation and to steady the neck against the voluntary movements of the patient. On the Neurosurgical Service, flexion is prevented and traction applied by means of a head halter or, occasionally, by wires passed through adjacent burr openings in the skull (skeletal traction). Either of these methods is commonly continued for a period of six weeks. If by that time the patient has recovered enough neurologic function to profit by sitting up or even trying to walk, some rigid form of neck support must be applied. That is the problem with which this paper is concerned. The apparatus here described is not advocated for the early treatment of cervical-spine injuries with cord damage, except under such unusual circumstances as were present in Case 2. Instead, it is meant to be used after any pre-existing dislocation has been reduced, and after a certain amount of stability has been acquired by the spine during six weeks of immobilization in traction, and, in particular, as soon as the patient is able to be out of bed.

The application of a rigid support to a patient whose spine injury is complicated by cord damage is made more difficult because of such damage. Frequently these patients can use neither arms nor legs to help themselves, and they must be lifted, turned and handled with the greatest care so as to prevent further cord damage. The need for care in handling such patients has long made us skeptical of the methods necessary to apply a plaster cast. Even in the best of hands, to say nothing of the efforts of junior house officers, the patient is subjected to what seems an undue amount of moving and manipulation under circumstances in which a single unguarded movement may cause further cord damage and permanent harm.

But this is not the only objection that experience has raised against the use of plaster casts. Patients with cord damage often have areas of cutaneous anesthesia, and it is well known that these areas withstand pressure, as from a cast, very badly and are prone to develop pressure sores. Furthermore, the weight of a cast is not an inconsiderable item for a patient whose motor power is so weakened by cord injury that merely supporting the weight of the body requires the greatest effort. A final contraindication is found in the looseness of the cast after it has been worn long enough to permit atrophy or weight loss from any cause to develop.

FIGURE 1. *Case 1.*

X-ray photograph showing anterior dislocation of the fourth cervical vertebra.

To avoid the disadvantages of plaster casts, we have tried other means of supporting fractured necks. Among these has been the use of a leather cuirass strengthened with iron braces. But such an apparatus, if it was to fit well, also required the making of a mold as a preliminary step. While the cuirass has advantages over a cast in the matter of weight and convenience, still the making of it requires approximately as much handling of the patient.

Finally, we were led to try an adjustable

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cervical-spine brace. The patient on whom it was tried was a nineteen-year-old boy (Case 1, J. B., No. 952827) who had suffered a fracture of the fifth-cervical vertebra, with marked anterior dislocation, in a diving accident (Fig. 1). There

FIGURE 2. *Case 1.*
Cervical support stabilized by attaching back brace.

was a complete dislocation of the articular facet on one side. The right arm and leg were completely paralyzed and there was hypalgesia below the level of the fourth cervical vertebra on the left, giving a Brown-Sequard syndrome. There was urinary retention, and lumbar puncture showed a partial block.

Halter traction was used for a period of four days, but was ineffective in reducing the dislocation. Skeletal traction was then applied for a period of seven weeks, during which the vertebrae were gradually realigned and the neurologic signs disappeared almost completely. Eight weeks after the accident, the cervical brace* shown in the frontal view in Figure 2 was applied. This has adjustable supports in front and in back, and it was thought that with reasonable co-operation on the part of the patient it would give adequate immobilization. But the patient could not be impressed with the need for limiting his activity, and, as one might judge from the small amount of purchase that the apparatus obtains on the thorax, flexion at the cervicodorsal junction was not sufficiently restricted, and the vertebrae began to slip again. After a short period of halter traction to improve the alignment the patient was put into a plaster cuirass. This was not removed until it appeared that moderately firm union had occurred. By this time the patient was clamoring for relief from the collar, which was badly soiled and unsightly. Some kind of support was still necessary, however, and it had to be of such a type as to immobilize the cervicothoracic junction. For this reason, a light, iron back brace was

FIGURE 3. *Case 1.*
End result of treatment.

attached to the adjustable collar previously used, as shown in the last two views in Figure 2.

This provided a high degree of immobilization

*Made by the Zimmer Manufacturing Company, Warsaw, Indiana.

combined with the greatest ease of attachment and removal. It also permitted the patient to wash and shave, and the apparatus did not become unsightly as had his cast. Although the support was completely adequate, it still permitted a large amount of activity and was much more comfortable than a cast. The end result of treatment is shown in Figure 3.

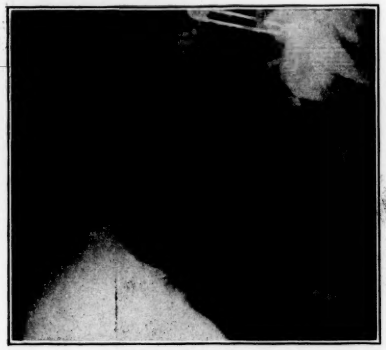

FIGURE 4. *Case 2.*
X-ray photograph showing fracture of the bodies of the fifth and sixth cervical vertebrae.

placement at the time the x-ray photographs were taken, he was unable to extend either arm, and only the left lower extremity showed a slight amount of voluntary motion. He was placed in head traction, and in the next three weeks recovered a small amount of function in all the paralyzed muscles. However, the threat of hypostatic pneumonia was ever present in spite of frequent changes of position, so that it was decided to get him out of bed much earlier than would have been risked with a younger patient. The combined neck support and back brace (Fig. 5) were applied each time before getting him up in a chair, and halter traction was used when he was in bed. In the eight weeks after he first left his bed he was up a considerable part of each day. Functional recovery progressed to the point where he was able to manage his wheel chair and could walk a little with help. Progress thereafter was more rapid and now, five months after his injury, he is normally active in every respect. There was no pulmonary complication, and the cervical spine remains in good alignment.

CONCLUSION

Two cases are reported that illustrate the use of an adjustable cervical-spine brace which can be fitted and applied with a minimum of handling of the patient, and which supplies adequate immobilization when well adjusted and tightly buckled. It is inexpensive. Its use avoids the disadvantages of plaster casts in treating cervical injuries with cord damage.

FIGURE 5. *Case 2.*
A seventy-eight-year-old patient in a combination brace.

Case 2 (M. F., No. 978915) illustrates another use for this type of neck support. This patient was a seventy-eight-year-old man who fell downstairs and fractured the fifth and sixth cervical vertebrae (Fig. 4). Although there was little dis-

REPORT ON MEDICAL PROGRESS

CANCER

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EXPERIMENTAL STUDIES

Anatomy

A HIGHLY significant contribution to elucidation of the mode of spread of malignant disease is the recent work of Batson[1] on the so-called "vertebral veins." This author by means of injections has demonstrated the richly anastomosing network of thin-walled veins, relatively poorly provided with valves, extending from the cranium to the pelvis, surrounding the bodies of the vertebrae and roughly paralleling the vertebral column. There are frequent communications with the caval venous system as well as with the nutrient vessels of the bones, the vessels accompanying nerves, the vasa vasorum and the intracerebral and intraspinal veins. Through this venous system metastases from malignant disease and sepsis may be disseminated through the body without the necessity of passing through the lungs and heart. Batson suggests that this mode of transmission is probably a common one, notably in cases of carcinoma of the prostate and breast, and that it satisfactorily accounts for the paradoxical wide dissemination of metastases without apparent foci in the lung fields. Certainly the distribution of the injected material in some of the illustrated preparations coincides remarkably with the distribution of skeletal metastases from prostatic carcinoma. Ordinarily this venous system is relatively stagnant, and may hold pooled reserves of a considerable amount of blood. The flow through it is apparently accelerated by coughing and straining, which cause temporarily increased pressure in the caval venous column.

Hormones

Interest in hormones in relation to the etiology of cancer has been focused particularly on the problem of breast tumors. Lacassagne[2] summarizes what is known in this field, as follows: cancer can occur only in a mammary gland which has undergone a certain degree of development; development of the mammary gland depends on the presence of estrogenic and pituitary hormones; it is open to question whether the hormones have any other relation to mammary cancer than that of bringing about the essential preliminary breast development. These conclusions bear out the earlier findings of Nathanson and Andervont[3] that the inhibition of mammary-tumor development by the use of testosterone is due to the inhibition of mammary development. Cramer[4] emphasizes the importance of this problem by pointing out that in mammary cancer the carcinogenic agent, if it is an estrogen, is a substance normally present in the body, and that it is therefore necessary to assume that it is present in excessive amount, or that it is not appropriately balanced and neutralized by other hormones, or that the susceptible person's tissues are unduly sensitive to normal amounts of the hormone.

Cramer and Horning[5] have drawn attention to a brown degeneration of the adrenal medulla in mice of high mammary-cancer strains. This degeneration is not secondary to cancer development, since it occurs in all individuals in the strain, and not merely in those which develop mammary cancer. As a result of this degeneration a hormone antagonistic to estrogenic hormones is diminished in amount, thus resulting in a relative increase in the effective amount of the estrogenic hormone. It is evident that Cramer and his associates attribute more direct etiologic significance to estrogens in mammary cancer than does Lacassagne. Cramer believes that patients with mammary cancer must at some time have presented a hormonal imbalance, and that it is reasonable to hope that some means of detecting such an imbalance will be devised or discovered. It is likely that even if the former were true, the imbalance would antedate the onset of cancer by many years.

Genetics

Reference was made in last year's review[6] to Bittner's[7] work on the effect of foster nursing on the incidence of mammary cancer in mice of high cancer strains. Murray and Little[8] have carried out further work on this subject, and conclude: "Some extra-chromosomal influence which is ten times as powerful as any possible chromosomal factor is instrumental in determining whether or not mammary cancer appears in the first out-cross generations. The tendency to have

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mammary cancer is not Mendelian in nature." Further studies are necessary before the nature of the extrachromosomal influence can be identified.

Bittner himself has repeated his foster-nursing experiments with mice of high lung-cancer incidence. In these animals, contrary to the experience with mammary carcinoma, the foster nursing did not affect the expected incidence of the tumor in the offspring. He concludes that probably one Mendelian factor was involved for the transmission of pulmonary carcinoma susceptibility in mice.

Immunity and Metabolism

Muus, Craig and Salter[9] induced varying degrees of immunity to an implanted tumor by Andervont's method. In this way the same transplanted tumor could be made to grow rapidly as a malignant tumor, or slowly as a benign one. This experiment clearly demonstrates that the degree of malignancy of a tumor is to a certain extent a measure of the defensive reactions of the host tissues. Careful metabolic determinations were carried out in an effort to determine differences between the benign and malignant modes of growth of the same tumor. There were no essential differences between the two as regards lactic-acid and ammonia production. Oxygen consumption was greater in the malignant mode of growth.

General Considerations

Education

The state departments of health of Massachusetts and Connecticut have each distributed a book on cancer to the practitioners of the states, with the object of providing authoritative descriptions of the signs, symptoms and proper methods of treatment of cancer of the various sites. The Massachusetts book, *Cancer: A manual for practitioners,* provides readable and scholarly chapters, each written by an authority in his particular field. It has been suggested that it would be an improvement if brief identification data for these authors were included. The book is well printed and bound, and will undoubtedly be preserved and referred to by its owners. Inevitably the information it provides will result in an improvement in the usual methods of managing cancer.

The Connecticut book, *Cancer: A handbook for physicians,* is smaller and less pretentious than the Massachusetts book. The chapters are written by various committees, rather than by individuals, and the resultant compromises of opinion as to methods of treatment are evident in many of the chapters. The essays are presented with numerous subheadings, with statements of the well-defined stages of the diseases, and outlines of appropriate treatment for each stage. The treatments recommended have the approval of the Cancer Committee of the Connecticut State Medical Society, which has tried to standardize methods in order to permit comparisons and to facilitate end-result studies.

Radiation

Physiology

Ewing[10] has attempted to account for the effectiveness of the divided-dose technics of radiation therapy on the basis of adaptation of the tissues. Normal tissues acquire a resistance to the dose, and by the third week of treatment can regenerate under the same dosage that initially caused destruction. Malignant cells cannot adapt themselves in this way, and hence the destructive action continues. Goldfeder[11] studied the respiratory changes in normal and malignant tissues in vitro following radiation. He found that the respiratory processes of the mammalian tissues are much less vulnerable than are the proliferative processes. Hence the effectiveness of radiation therapy against cancer must lie in its influence on the latter rather than on the former. Brues, Marble and Jackson[12] have carried out studies on the effect of colchicine in rendering tissues sensitive to radiation. They conclude that the administration of colchicine does not enhance or accelerate the effects of radiation in causing tumor regression.

Injuries

Radiation injuries to various normal structures develop as a result of intensive therapy for malignant disease. Warren and Spencer[13] report a series of cases showing pulmonary damage and fibrosis, and a careful study of the histological injuries. Watson and Scarborough[14] emphasize the dangers of osteonecrosis of the jaw in the treatment of intraoral cancer. In a series of 1819 cases of intraoral cancer they encountered 235 cases (13 per cent) of osteonecrosis. Intestinal injuries secondary to radiation of carcinoma of the cervix are reported by Corscaden, Kasabach and Lenz,[15] while Todd[16] reports 24 cases of rectal ulceration from the same cause.

Supervoltage

Numerous reports describing experiences with therapeutic use of voltages in excess of 200 kilovolts continue to appear. Mudd, Emery and Levi[17] believe that supervoltage is more effective than high-voltage therapy in cases of carcinoma of the cervix and prostate. They could find no advan-

tages in treatment with supervoltages in cases of carcinoma of the breast, pharynx or larynx. Leucutia[18] reports a series of 312 cases treated with 500 kilovolts and thinks that the results were superior to those secured with 200 kilovolts. Schmitz, Schmitz and Sheehan[19] report their results in treatment of carcinoma of the cervix by this method. Evaluation of the possibilities and field of usefulness of supervoltages will obviously require more time and experience.

Radioactive Isotopes

The possibility of preparing radioactive isotopic substances which are identifiable in minute quantities has given tremendous impetus to investigation of the role and mode of metabolism of various substances in the body. The use of radioactive zinc, arsenic, phosphorus and so forth has permitted studies of the metabolism of insulin, arsenical drugs and phospholipids (Jones, Chaikoff and Lawrence[20]). The application of radioactive isotopes to problems of the therapy of malignancy is still in an experimental stage but offers great promise. Thus, Lawrence, Scott and Tuttle[21] have experimented with radioactive phosphorus in the treatment of leukemia.

Crymotherapy

In a paper entitled "General Crymotherapy," Gerster and his colleagues[22] report four months' experience at the Lenox Hill Hospital, with the "artificial hibernation treatment" of Smith and Fay.[23] The patients treated up to the time of their report were intensively studied in every respect, and the reports describe various aspects of the studies. Gerster's conclusions are of great interest:

> It was possible to reduce patients' temperatures from 10 to 18°F. below normal for from a few hours to three days (counting from time 90°F. was reached on the way down to the time 90°F. was reached on the way out; totaling 2856 hours below 90° in sixty-five inductions on 26 patients).
>
> Inductions can be repeated, at intervals, as many as five times or more, depending on the patient's general condition.
>
> Risks from pneumonia and from nephritis seemed not so great as might be expected.
>
> In malignancies, striking relief from intractable pain with discontinuance of narcotics was noted in 11 of 17 patients.
>
> Sooner or later pain returned, sometimes less severe, in others just as severe as before treatment.
>
> As time went on progressive cachexia was noted.
>
> Perhaps, if intervals between treatments were made shorter, a difference in recurrence of pain and progress of cachexia might be noted. This is to be given a trial; we have not had enough experience.
>
> Our material, available during the past few months, has not afforded sufficient experience regarding the effect of local refrigeration to justify drawing conclusions.

Paltauf[24] reports the histological and pathological material obtained in this study. Of 5 autopsied cases, 3 showed acute inflammatory lesions in the pancreas, which varied in degree from focal areas of necrosis to hemorrhagic pancreatitis with extensive fat necrosis. In 2 cases of breast cancer marked necrosis of the tumor tissue was noted in all the metastases. Paltauf was unable to find any regression of the primary tumors or metastases, "nor were we able to demonstrate unusual cell alterations or any changes which could be interpreted as effects of crymotherapy on the neoplastic tissue." Of the 27 patients subjected to general crymotherapy, 13 had died at the time of the report, and 6 had died within eight days of completion of the treatment. It seems likely that these deaths were hastened by the treatment.

Bischoff and Long[25] induced hibernation in mice with sarcoma. They found it possible to reduce the body temperature of mice below 20°C. for seven-hour periods on five successive days, or for a continuous twenty-four-hour period. Their measurement of temperature was restricted to skin-temperature observations. Careful study demonstrated no effect on the size or histology of the tumors as a result of such treatment.

It is probable that general crymotherapy will be found to be effective as a palliative procedure in certain cases with intractable pain, but it is doubtful whether it offers much hope as an effective weapon against malignant disease. In this connection it is interesting to note that Klinke[26] has demonstrated that a malignant cell can remain viable after chilling to a temperature of −200°C.

Regional Cancer

Cystic Mastitis

Warren[27] has made a painstaking study of the relation of chronic cystic mastitis to cancer. Follow-up studies on all patients in whom a pathological diagnosis of chronic cystic mastitis had been made disclosed an incidence of breast carcinoma considerably higher than that expected. Warren's conclusion is that the condition is definitely pre-cancerous. This tendency is not so marked as to justify bilateral simple mastectomy in all cases in which the diagnosis is made. These patients, however, must be very carefully observed at frequent intervals throughout the remainder of their lives. The pre-cancerous tendency is apparently greater in younger women than in older women.

Agnogenic Myeloid Metaplasia

Jackson, Parker and Lemon[28] have recently described a condition which they designate as "agnogenic myeloid metaplasia" of the spleen. The importance of this condition is that it has frequently been confused with leukemia. Radiation of the spleen is useless and possibly dangerous.

Acid Phosphatase

Gutman, Gutman and Robinson[29] emphasize the fact that in carcinoma of the prostate there is an elevation of the level of the acid phosphatase in the blood serum. They suggest that a determination of this substance may help to distinguish between bone metastases of carcinoma of the prostate and Paget's disease of the bone. In the former condition the acid phosphatase is usually greater than 3 units per 100 cc.

Fibrosarcoma

McNamara, Smith and Boswell[30] report a series of 16 autopsied cases of retroperitoneal fibrosarcoma. Metastases were present in only 2 cases. The authors conclude, "It may be assumed that if it were possible to detect the tumor at an early stage and to subject it to radical surgical extirpation, recovery would result." Warren and Meyer[31] studied lymph-node metastases of sarcoma. They found such metastases in 7 per cent of their cases of sarcoma; chiefly in patients with fibrosarcoma. They conclude that regional dissection offers some hope of cure in patients who apparently present regional lymph-node involvement.

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CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

ANTEMORTEM AND POSTMORTEM RECORDS AS USED IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor*

CASE 26381

PRESENTATION OF CASE

A full-term normally delivered white male infant, weighing 9 pounds, was placed in the nursery immediately after birth. The infant was normal to physical examination, and the mother enjoyed an uneventful postpartum course. The child had cried lustily and had a good color. He took his feedings well and to all criteria seemed to be a normal, healthy, baby. However, on the second postpartum day the child became cyanotic during its 10:00 a. m. feeding of lactose. The cyanosis involved the face, lips and extremities. A carbon dioxide and oxygen mixture was administered, and the episode passed away. During the attack, physical examination revealed an active baby somewhat darker red in color than one would expect forty-eight hours after delivery. The heart was normal, the lungs clear. The fontanelles were soft, and the neurological examination negative. The tongue was normal; the nose was not obstructed. X-ray films of the chest on the third day showed clear lungs; the heart was slightly prominent in the region of the right auricle, but there was no gross enlargement. Barium passed through the esophagus normally. On the sixth day the temperature rose to 100°F., and the infant lost 3 ounces of weight in a twenty-four-hour period. The respirations were normal, but the child continued to have a dusky color. The chest was clear, the fontanelles normal; there was no cough or sniffles. The child seemed vigorous and took 3½ ounces of formula at each feeding, plus water between meals; he seemed well hydrated, and gained 1 ounce in weight. On the seventh day the temperature was 101°F. at 6 a.m., but it fell to 98.8 at 10:00 a.m. On the ninth day the child cried constantly as though he were in pain. There was a definite hypertonia, particularly of the upper extremities and jaw, which almost suggested trismus. The fontanelles were negative. The throat was poorly seen. The heart and lungs were negative. The abdomen was negative except for the presence of a small amount of gas. The umbilicus was healing well. Reflexes were active. A lumbar puncture was done. The fluid was not under increased pressure. About 20 drops of xanthochromic fluid was removed over a period of ten minutes. A culture showed a moderate growth of colon bacilli.

At midnight of the tenth day after birth, the baby began having a series of increasingly severe convulsions, each lasting two minutes or more. The temperature was 100°F.; but it fell to 98 following the convulsions. The arms and legs stiffened, cyanosis appeared, and respirations ceased in deep inspiration. In ten to fifteen seconds these "spasms" of inspiration passed and breathing again recurred normally, although with an expiratory grunt. Luminal, calcium gluconate, and carbon dioxide and oxygen were administered, but the convulsions recurred and became more severe The respirations between the convulsive states became shallow and irregular. The heart rate remained around 160. In spite of all efforts the child quickly failed, and died on the tenth hospital day.

DIFFERENTIAL DIAGNOSIS

DR. SIDNEY FARBER:* I have been on the other side of the fence so long that this is a welcome change. If you hear any clinical remarks of strange import please remember that I am a pathologist.

It is stated that at birth the "infant was normal to physical examination." In many cases an apparently normal physical examination may not be borne out by the future course of the infant. Signs of cerebral hemorrhage may develop, or anomalies in structure may manifest themselves within the next ten days or two weeks.

The child was cyanotic, and we are faced with the possibility of obstruction of the trachea rather than of the esophagus. We may be more apprehensive and think there might have been a tracheoesophageal fistula or suspect that the feedings were a great effort for the baby and brought out cyanosis on the basis of some severe change elsewhere in the lungs, brain or heart. We may think of obstruction outside the trachea, such as a vascular ring around the trachea and the esophagus, or of transposition of the great vessels.

I should like to make a generalization about the young infant. Positive physical findings are very important; changing physical findings are of considerable importance; but negative physical findings are of very little importance. The heart was normal, but no cardiac examination at this age can be so complete as to exclude congenital defects. The lungs were clear. We must recall that early interstitial pneumonia in the new-

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born is usually unaccompanied by physical signs.

Cerebral hemorrhage may be present, although we should expect more in the way of respiratory symptoms. The fontanelles need not be bulging.

The tongue was normal. I have seen cyanotic attacks at this age due to hyperplasia of the tongue or macroglossia; these are produced by the tongue falling back on the glottis and thus causing respiratory difficulty, particularly during feeding.

The x-ray films of the chest on the third day "showed clear lungs." If Dr. Schatzki will permit, I shall make the same statement about x-ray examination; that is, clear x-ray films of the lungs do not rule out pulmonary disease, particularly if the changes be in the nature of congestion, edema or pneumonia, which are common findings at this age.

"The heart was slightly prominent in the region of the right auricle." That prominence at the right auricle may suggest congenital heart disease. We shall discuss that later. The prominence may be caused, of course, by the position of the normal thymus gland. I shall not consider the thymus gland as a possible cause of the cyanosis. There was no gross enlargement of the heart, but that finding does not rule out a congenital anomaly. The fact that barium was administered suggests that tracheo-esophageal fistula was excluded in the minds of the doctors. Had there been suspicion of a tracheo-esophageal fistula no barium would have been given, because of the danger of barium pneumonia. The barium passed through the esophagus normally, so any suspicion of atresia of the esophagus or stenosis of the esophagus may be dropped. It is possible that the barium may have been given to outline the left side of the heart, with the hope that a vascular ring around the esophagus might be outlined better in this manner.

The child seemed vigorous at this stage; presumably the cause of the difficulty was not great enough to disturb it, unless some other factor was added to the existing defect. Such variations in the temperature as are noted are consistent with bronchopneumonia or infection anywhere in the body in the neonatal period.

"On the ninth day the child cried constantly as though he were in pain." That is a very important symptom. It may point to central-nervous-system disease, with hemorrhage or meningitis. The cause for such crying may be pulmonary disease, such as pneumonia, or there may be a disturbance within the abdominal cavity, such as volvulus on the basis of malrotation of the intestine. Such a volvulus might repeatedly disengage itself without surgical help. An embolus on the basis of congenital heart disease, lodged in an abdominal viscus might be the cause of such pain, or it might be explained on the basis of kidney disease, such as pyelonephritis.

"There was definite hypertonia, particularly of the upper extremities and jaw, which almost suggested trismus." Here we have symptoms definitely pointing to the central nervous system, although the damage might be no greater than that caused by cerebral edema secondary to bronchopneumonia. Because of the mention of trismus, we do suspect infantile tetany, but there was no Chvostek's sign or other evidence to lead us to consider the diagnosis more seriously. I drop it anyhow because tetany is somewhat beyond the province of the pathologist.

"The umbilicus was healing well." We may be misled by a healing umbilicus. Externally it may be normal in appearance but still be the site of an important infectious process. Organisms may enter, pass up the umbilical vein and enter the circulation while superficial healing is going on. There is no evidence, however, that the liver was enlarged, due to abscesses, nor were there other signs of a widespread inflammatory process.

"A culture of the spinal fluid showed a moderate growth of colon bacilli." We have no evidence in the nature of a smear of the fluid or a cell count to confirm the positive culture from the spinal fluid. It is hard to disregard a laboratory report, but I should like confirmatory evidence of meningitis. At this age meningitis caused by the colon bacillus is common. Ten per cent of all babies who die under one month of age die of meningitis, and the causative organisms, in the order of their frequency, are colon bacillus, pneumococcus, streptococcus and staphylococcus.

DR. TRACY B. MALLORY: No cell counts of the spinal fluid were made, or at any rate recorded, and no smears were stained for bacteria. Some red cells were noted, however.

DR. FARBER: With that report I shall have to consider colon-bacillus meningitis, but I cannot make a positive diagnosis without a finding of bacilli in a direct smear of the spinal fluid.

"The arms and legs stiffened, cyanosis appeared, and respirations ceased in deep inspiration." Here we have a series of changes that could be brought about by cerebral hemorrhage, meningitis or bronchopneumonia, with no alteration in the brain except edema.

"In ten to fifteen seconds these 'spasms' of inspiration passed and breathing again recurred normally, although with an expiratory grunt." These findings again may be caused by central-nervous-system disease or bronchopneumonia.

Luminal was given to quiet the patient, calcium gluconate in the hope of relieving tetany if it were present, and carbon dioxide and oxygen on general principles, I suppose.

The two main problems here are cyanosis and convulsions. Cyanosis is by far the more important of the two findings, since convulsions did not occur until the end. The cause of cyanosis in the first ten days of life in the absence of positive physical findings is more often demonstrated at the autopsy table than explained before death, at least in my experience. We look to the central nervous system, the lungs and the heart for the usual causes of cyanosis in the neonatal period.

Cerebral hemorrhage may occur even in the presence of normal physical findings at birth if the torn vessel is a tributary of one of the sinuses, provided that the vein of Galen is not torn. It is commoner to find a tear of a small vessel than of one of the great veins of the skull. Such hemorrhage, to be extremely important, must be located beneath the tentorium. Small hemorrhages occur rather readily, particularly in the subtentorial region of the brain, because of the peculiar architecture of the brain in this area in the newborn. Cerebral hemorrhage may occur on the basis of asphyxia. We have no evidence of that in this patient. Meningitis has been mentioned as a possibility. Meningitis in the neonatal period may be secondary to bronchopneumonia or, more often, to otitis media on the basis of hematogenous spread of the infection. Colon bacilli, contained in infected amniotic fluid, may enter the middle ear during delivery. If that is the case, at autopsy a smear of the middle-ear exudate will show, in addition to organisms, numbers of cornified epithelial cells from the amniotic sac.

If we look to the lungs there are three things that might cause cyanosis: bronchopneumonia, which presumably developed late rather than early, since at first there were no definite signs pointing to the lungs; aspiration of amniotic-sac contents, with vernix membranes outlining the alveolar-duct walls and bronchioles — this may not be important as a cause of cyanosis until the second or third day, when the foreign material has been drawn far into the lungs to form an effective barrier to the passage of oxygen from the air spaces to the alveolar-wall capillaries; and congestion and edema secondary to cardiac disease.

The third cause of cyanosis at this age period is congenital heart disease. With a prominent right auricle we should suspect some change in the pulmonary valve or an interventricular defect. Anomalies of the aorta or calcified masses in the tricuspid valve may be the cause of cyanosis. I mention bizarre types of congenital anomalies rather than simple ones because congenital heart disease to be the cause of death in the neonatal period must be exceedingly severe. I might mention transposition of the great vessels. Anomalies of the great vessels include as possibilities a vascular ring surrounding the trachea and esophagus, due to persistence of the fourth aortic arch, — a reptilian aorta, — or some anomaly of the subclavian or left pulmonary artery so that pressure against the trachea or esophagus results. These are only possibilities; there is no means of making a definite clinical diagnosis of the exact type of a cardiac anomaly.

We might mention other possibilities. We have no evidence that the blood sugar was low; however, massive adrenal hemorrhage or a great increase in the amount of islet tissue in the pancreas has been noted as an explanation of both cyanosis and convulsions in the newborn. I will not go farther afield, but will commit myself to three general diagnoses. The first is congenital heart disease. My reason for mentioning that first is that there is no evidence that any other system was involved from birth as the primary cause of the prevailing difficulty, and congenital heart disease may remain masked, until additional strain is put on the circulation. The second is pulmonary congestion and edema, with terminal bronchopneumonia, and the third, hemorrhage into the central nervous system, very likely below the tentorium. I must add as a possibility, as remote as all the others I have mentioned, colon-bacillus meningitis.

A Physician: Subdural hemorrhage in older people produces symptoms in about this length of time, due to the absorption of fluid. Is this also characteristic of children?

Dr. Farber: I should have discussed that. Subdural hemorrhage is a possibility, although it is not the commonest cause of cyanosis in this age period.

Dr. Schatzki: It is difficult to interpret the findings in an x-ray picture of the chest of a newborn baby. They are not reliable, so far as the heart is concerned. There is no way of diagnosing congenital heart disease at this age, unless the changes are very marked. There are no marked abnormalities in this case in regard to the size and shape of the heart. Another factor that enters into interpretation of the heart of a baby is the moment of respiration in which the film was taken. If the baby is crying, one sees a decrease in the size of the heart and an increase in the size of the upper mediastinum, with marked changes in the configuration of the heart and of the middle shadow. In other words one needs

fluoroscopy in a questionable case. From the films I should say that there is no evidence that there was anything wrong with the heart.

The situation in the lungs is different. If the films are good, one can be fairly certain as to whether or not there is pulmonary disease. There is no evidence of lung disease on this film.

A Physician: Could this patient have had tetany?

Dr. Farber: I suppose it is a possibility. I have not heard of it in an infant of this age.

Clinical Diagnosis

Convulsions.

Dr. Farber's Diagnoses

Congenital heart disease.
Pulmonary congestion and edema, with terminal bronchopneumonia.
Central-nervous-system hemorrhage, probably below the tentorium.
Colon-bacillus meningitis?

Anatomical Diagnoses

Colon-bacillus meningitis.
Colon-bacillus septicemia.
Acute pyelonephritis.
Pulmonary congestion and edema.

Pathological Discussion

Dr. Mallory: I think this case brings out clearly the difficulties with which the pediatrician is faced. The average stay of an adult in this hospital is seventeen days, and about half of that time is spent in making a diagnosis. Moreover the adult patient, unless acutely ill, can be put through the diagnostic mill with several types of examination during each day, which is quite impossible with a child. It is infinitely more difficult to accumulate the necessary data on a child, and almost invariably many of the things you would like to know are missing. However, one simple measure was needlessly omitted here which would have settled the diagnosis immediately. That was the examination of a gram-stained smear of the spinal fluid.

The clinical diagnosis on the death report that reached the laboratory was "convulsions." The autopsy showed that the primary disease was in the central nervous system. In the body elsewhere we found only two things. There was a severe grade of acute pyelonephritis, not foreshadowed by any of the symptomatology, and there was marked focal hemorrhage throughout the lungs. The latter, grossly, we thought was due to pneumonia, but on microscopic examination I cannot be convinced that it is anything but hemorrhage and edema. The brain proved more interesting and showed marked meningitis, from which the colon bacillus was cultured. The heart's blood and the kidneys also showed colon bacilli in pure culture. The meningeal exudate in this case was in many places reddish-brown, a finding that suggests a considerable degree of hemorrhage. I am not familiar enough with colon-bacillus meningitis to know whether this is a characteristic finding.

CASE 26382

Presentation of Case

A sixty-two-year-old clerk was admitted to the hospital complaining of low-back pain.

The patient stated that he had been ill in bed for one year at the age of sixteen. It was thought but never proved that the disease had been tuberculosis of the spine, as he had an attack of pleurisy at the onset of the illness; there were no other apparent signs of pulmonary tuberculosis. When he resumed activity he had a marked curvature of the spine, which persisted throughout his life. Until he was thirty he had suffered with "asthma." He otherwise enjoyed good health and led a moderately active life, being limited only by the dorsal kyphoscoliosis. With fatigue he had on occasions experienced low-back pain for many years. About three weeks before admission this became worse, especially at night. He consulted a dentist two weeks before entry, and two right lower molar teeth had been extracted, one coming out "whole" and the other "in several pieces." The next day the lower face and both eyes were swollen. Two days afterward, or eleven days before admission, these symptoms increased, and the low-back pain became acute. A physician found marked local tenderness over the left lower sacral region. A diagnosis of bursitis was made, and the pain was completely relieved by a local injection of novocain solution. However, the painless swelling of the right face and eyes continued to increase until about one week before entry, when it gradually began to subside. Three days before admission he developed slight "difficulty" in breathing, especially at night. He began to snore, and complained of an inability to breathe easily through the nose. There were no other symptoms. The remaining family, marital and past histories were non-contributory.

Physical examination revealed a somewhat poorly developed and poorly nourished man who had marked, fixed, right, mid-dorsal, structural scoliosis, with rotation on the convexity, and marked kyphosis. The face, especially the right side, was

edematous, particularly below the supraorbital ridges. There was slight cyanosis of the lips, fingernails and toenails. The superficial neck veins and the external jugular veins were engorged with the patient sitting upright, and the anterior chest and scapular regions of the back were covered with networks of engorged superficial varicosities. The skin in these areas was somewhat cyanotic. The pupils were small and equal and reacted well to light. However, two days later another observer found them unequal, the right being two times larger than the left. Ocular motility and the visual fields were normal, but the retinal veins of the left eye were somewhat engorged. The veins of the right eye and both nerve heads were normal. The nose and ears were normal. The sockets from which the right lower molar teeth had been removed were healing fairly well. (X-ray films showed a tooth fragment in the anterior socket; this was removed, and healing progressed uneventfully.) Otherwise the mouth, nasopharynx, oropharynx and larynx were normal. Because of the chest deformity examination of the heart was difficult. It was thought to be enlarged, and a blowing systolic murmur was heard. The blood pressure was 100 systolic, 80 diastolic. The pulse was regular and of good quality. The respiratory excursions were small. There were scattered crepitant rales in the right base and left mid-chest, laterally. The abdominal and rectal examinations were negative. Venous pressure was increased in both arms by rough test. The legs were normal. Throughout the examination the patient appeared drowsy and at times seemed to find it difficult to carry on a train of thought.

The temperature was 98°F., the pulse 90, and the respirations 22 per minute.

Examination of the blood showed a red-cell count of 4,400,000 with a hemoglobin of 12.0 gm. (photoelectric-cell technic), a white-cell count of 6800 with 69 per cent polymorphonuclears, and an essentially normal blood smear. The urine was negative. Culture of the throat and the tooth sockets were negative for beta hemolytic streptococci. Blood cultures were negative. A blood-nonprotein nitrogen determination was normal.

Roentgenograms and fluoroscopy of the chest revealed a suggestive mass in the region of the right upper mediastinum. Intravenous injections of dye into the arm, to reveal venous channels, showed that no blood or dye returned by the subclavian vein, but rather by a collateral circulation.

He ran an irregularly downhill course. On the ninth hospital day, when a series of thirteen x-ray treatments (200 to 300 r daily) was begun, the patient developed an elevated temperature (99 to 102°F.), which persisted. For the first two weeks the facial edema and venous obstruction increased slowly, but a few days after roentgen therapy was stopped, it gradually decreased. Oxygen-tent therapy relieved the cyanosis and slight dyspnea. Chest plates taken three weeks after the completed treatments showed that the mediastinal mass was barely visible; there was an indefinite serrated margin, with no compression of the trachea. No cavities were seen, although a faint mottling had been noted on a plate taken the day when treatment was stopped. X-ray films of the spine were inconclusive in regard to metastasis.

The patient developed urinary retention, with an atonic bladder, which required constant drainage. The urine became infected with large numbers of proteus bacilli, which on culture overgrew colonies of gram-positive cocci in clusters. The white-cell count rose to 23,000, and he was given sulfanilamide. This caused malaise and cyanosis, and was discontinued. He gradually failed, and died on the fiftieth hospital day.

Differential Diagnosis

Dr. Earle M. Chapman: I should like to call your attention to the facts that the chief complaint was low-back pain and that according to the history he had had, when fatigued, low-back pain for many years; recently it had become worse, especially at night. This, of course, suggests bone pain.

Unfortunately there is no note of the type of anesthesia used when the teeth were extracted. We do not know whether it was done under local or general anesthesia. We do not know whether the pulmonic second sound was louder than the aortic, possibly because of the displacement of the heart; so controversy arises on that point. No lumbar puncture is recorded, although the patient had mental symptoms — drowsiness and so forth.

With so much deformity of the chest, it is very difficult to interpret the x-ray film, but I presume this is the mass referred to. I can make out the heart fairly well, and it seems to be enlarged. He has rather more prominence of the aorta than a person should have. This represents the curvature of the spine. The lung fields themselves are quite clear. Then by using a double exposure and a certain amount of rotation this area appears, which does not seem to be part of the spine and in which there are no normal structures. You can see the bronchus fairly well, coming down on the left side, and it appears to be normal. The trachea is normal. I do not see the bronchus of the right

lung, but it must be patent, otherwise the lung would not be inflated.

His physician found tenderness over the lower sacral region. The lesion, if there is one, is not in the sacroiliac joint but in the ilium just above the acetabulum.

The record states that intravenous dye injections revealed that the venous channels showed no blood or dye returned by the subclavian vein but rather by a collateral circulation. Tumor and swelling were described on the right, so we can assume this was right. I take it the obstruction was mainly on the right.

DR. TRACY B. MALLORY: There is one point in the physical examination which seems to have been omitted in the record. On various subsequent physical examinations after the first one a unilateral wheeze was noted on the right — an expiratory wheeze.

DR. CHAPMAN: From the description it suggests obstruction of the right main bronchus.

DR. AUBREY O. HAMPTON: In this lateral film of the lower lumbar spine, there might be something here. It certainly is an abnormal appearance, but it is confused by the scoliosis and arthritic changes. With this process in the chest, which is also abnormal, you begin to wonder if the whole thing might not be metastatic cancer.

DR. CHAPMAN: If the body was tipped to the right side, do you think increased body weight could account for the changes in the spine?

DR. HAMPTON: Yes.

DR. CHAPMAN: I was asked to discuss this case because we* studied cases of severe kyphoscoliosis two or three years ago in an attempt to explain the patients' sudden and often dramatic death. We investigated some ten or twelve cases at the Fatigue Laboratory at Harvard University. This case seems like a very bizarre and difficult situation to explain. It does not seem to fit into any of the patterns that we described. I should like to quote a word or two: "Those afflicted with severe chest deformities are greatly handicapped and rarely live to old age." This man lived to fifty-two. "Such deformities have occasionally proved fatal through secondary effects such as pulmonary infection, paraplegia or esophageal obstruction, but the most dramatic and probably the most frequent cause of death of the hunchbacked has been pulmonocardiac failure." Certainly this man did not have esophageal obstruction, and from the record as you hear it, it sounds as though pulmonary infection was suspected, because of the x-ray findings, and even tumor was suspected, because x-ray therapy was given. However, these two diagnoses seem unlikely to me in view of the subsequent events. This man apparently did not have paraplegia, but there is some suggestion that he had pressure on the nerve roots or perhaps within the vertebral canal itself. The fact that he entered with an atonic bladder suggests cord pressure. He had back pain, but he had had it for many years; it grew increasingly worse and was finally his chief complaint.

There are two possibilities to explain this rather complicated picture. Obviously for the answer to either we need more information than is available from the case history. The first is that, because of the history of tuberculosis of the spine which we can accept, later in life one of the vertebrae crushed and he developed a paravertebral tuberculous abscess, which was described as the mass at the hilum or that Dr. Hampton described on the right. A mass at that level could produce a large pupil on the right. It could, by extension, eventually cause involvement of the subclavian vein on the right. It could even produce pressure on the right main bronchus, with the signs Dr. Mallory has suggested. It could also cause a thrombophlebitis inside the vein, and thus precipitate a final pulmonocardiac failure. He had tachycardia, rales in the chest, and a narrow pulse pressure. He was cyanotic and had an increased venous pressure, and finally died. So with these findings he did have pulmonocardiac failure. A paravertebral abscess along the spine causing pain and tenderness and finally a cord bladder is a possibility. The other is that he developed these symptoms of failure following tooth extraction. What kind of anesthesia did he have?

DR. MALLORY: Novocain.

DR. CHAPMAN: At least he had an operative procedure. We know that phlebitis in blood vessels does follow such a simple operation as tooth extraction. It is possible that following this he developed a thrombophlebitis in the innominate or subclavian vein; the field is right for such a complication because of this twist and torsion of the mediastinal contents, with probably some hindrance in the venous return. I should put this as a second choice.

Now what should we expect to find at autopsy? I believe that very likely he did have a break somewhere in the spine — one of the vertebrae crushed to produce a paravertebral abscess. There probably was a dilated and enlarged right ventricle, for this is the commonest finding at autopsy of kyphoscoliotic patients; this film shows enlargement at the base, but the heart appears to be of normal size lower down. Strangely enough in

*Chapman, E. M.; Dill, D. B., and Graybiel, A.: The decrease in functional capacity of the lungs and heart resulting from deformities of the chest: pulmonocardiac failure. *Medicine* 18:167-202, 1939.

kyphoscoliosis the majority twist to the right, very few to the left. That has led to one theory to explain pulmonocardiac failure; namely, that with the main curvature to the right, the compensatory curve to the left pushes the heart and squeezes it against the left chest wall. One thing that nearly all these patients have is a marked diminution in vital capacity. Unfortunately there is no record of vital capacity in this case. We know that in youth, when he was adjusting himself to an obviously diminished lung space, this patient had a period of asthma.

As to the final handling of the case, which covers a period of several weeks, I can make no comment. He was given sulfanilamide, and finally died. I believe the sulfanilamide played no role in the cause of death. I doubt if there were any toxic effects except that it did increase the cyanosis.

Dr. James S. Stillman: Sulfanilamide was given in small doses on the advice of the urologist. I do not believe he had a high blood-sulfanilamide level, although a determination was not made. The cyanosis came on gradually a few days following the completion of x-ray treatment. Very slowly for a period of six weeks and very rapidly two days before death he began to develop the signs that had led to the fatal outcome. The reason a lumbar puncture was not done was that it was thought that the mental cloudiness was due to poor venous return and consequent anoxemia; the mental state cleared as soon as the anoxemia was relieved by an oxygen tent.

Dr. Chapman: Did he have engorgement of the veins to the left as well as the right?

Dr. Stillman: Yes.

Dr. Robert J. Joplin: The one thing that particularly interests me is the observation Dr. Hampton just made when he looked at the anteroposterior and lateral roentgenograms of the pelvis. These plates were taken in the Emergency Ward on the day the patient was admitted. At that time the patient had so much pain localized over the sacrum that he was unable to lie in bed on his back. After a very uncomfortable night he was brought into the hospital with the diagnosis of acute bursitis over the bony prominence of the sacrum and with the plan of injecting the bursa with novocain and washing it out with saline. Because this was an unusual place for a bursitis, it seemed fair to the patient to have an x-ray picture taken first in order to rule out any underlying pathologic condition that might be present in the bone. The roentgenograms were taken, and the wet plates were interpreted by the radiologist then on duty in the Emergency Ward as negative for any pathologic condition in the bone in that area. Therefore it was believed that the discomfort was due to a superficial condition. For this reason he was taken to the operating room. Novocain was injected with immediate relief of the pain. The area was irrigated in the usual way with normal saline. The patient had no more discomfort in the area following this procedure.

Dr. Ralph Adams: I saw the patient in consultation after he had developed a classic mediastinal-pressure syndrome and had a unilateral wheeze. Since unilateral wheeze is practically diagnostic of bronchial obstruction, its appearance here was presumptive evidence of primary lung cancer. The amount of mediastinal compression was an unusual and confusing feature of the case.

I wish that someone would say a word about the response to x-ray therapy, because it is a matter of practical clinical importance.

Dr. Charles S. Kubik: Can you guess the type of cell that would show a good response?

Dr. Hampton: The only cases reported here that have responded were those of the oat-cell type, and we naturally suspected such a tumor. It is difficult, I think, from the history to be certain whether the patient did respond. If it is true that he did respond to the treatment, I should think that you would interpret the treatment as being evidence of carcinoma of the bronchus of a rapidly growing type.

Clinical Diagnoses

Lymphoma?
Kyphoscoliosis.

Dr. Chapman's Diagnoses

Tuberculosis of the spine.
Kyphoscoliosis.
Paravertebral abscess, tuberculous.
Cord bladder.
Terminal pulmonocardiac failure.

Anatomical Diagnoses

Bronchiogenic carcinoma, with metastases to peribronchial and mediastinal lymph nodes, liver, spleen, adrenal glands and sacrum, and extension to trachea and superior vena cava.
Pulmonary emphysema, right middle lobe.
Pulmonary atelectasis, left.
Cor pulmonale, slight.
Kyphoscoliosis, marked.
Hydrothorax, bilateral.

Adenocarcinoma of prostate.
Prostatic abscess.

Pathological Discussion

Dr. Mallory: The postmortem showed, of course, an extreme grade of scoliosis, with marked changes secondary to that. It also showed thoracic cancer, the major part of the tumor being in the mediastinum; but there was also a tumor in the right upper lobe of the lung, which we thought was in all probability primary in the right upper-lobe bronchus. On microscopic examination it was a very highly malignant, rather small-celled carcinoma, with, however, numerous scattered giant cells. I hesitate a little to call it an oat-cell carcinoma.

We had a further surprise when we sectioned the prostate and found that that also was carcinomatous. This was a well-differentiated adenocarcinoma, and I cannot conceive of its having given rise to such an undifferentiated metastasis as the tumor in the lung. I think it is more reasonable to assume that he had two independent carcinomas. There was also an abscess in the prostate, which was undoubtedly more responsible for the urinary symptoms than the carcinoma.

The fluctuant mass over the sacrum proved on incision to be a very large cavity through which ran all the fibers of the cauda equina, the posterior wall of the sacrum having been entirely destroyed by tumor. The tumor here was of the same type as the pulmonary tumor, not like the prostatic one.

The lungs also showed a well-marked emphysema of the right middle lobe, with a moderate degree of collapse of the left side, findings that you would expect in a scoliotic patient of this type. The heart was small and weighed only 225 gm. The right side was definitely hypertrophied, the ventricle measuring 6 mm. in thickness, which one could call evidence of a slight cor pulmonale.

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AS I REMEMBER HIM

Certainly no friend of Hans Zinsser, knowing his low opinion of orthodox obituary documents, could bring himself to write one about him. A sentimentalist at heart, he could not bear the thought of sentimental words used by others in relation to himself or his activities.

In deference then to his known wishes, we choose to refrain from personal comment and let this scientist-poet speak for himself. In his latest published book,* avowedly produced as a biography of "R.S.," he tells so well about himself what we all want to know that with the permission of his family and publishers we are printing excerpts from the last chapter.

*Zinsser, H.: *As I Remember Him: The biography of R.S.* 443 pp. Boston: Little, Brown & Co., 1940.

But in those few minutes, R.S. told me, something took place in his mind that he regarded as a sort of compensatory adjustment to the thought that he would soon be dead. In the prospect of death, life seemed to be given new meaning and fresh poignancy. It seemed, he said, from that moment, as though all that his heart felt and his senses perceived were taking on a "deep autumnal tone" and an increased vividness. From now on, instead of being saddened, he found — to his own delighted astonishment — that his sensitiveness to the simplest experiences, even for things that in other years he might hardly have noticed, was infinitely enhanced. When he awoke in the mornings, the early sun striking across the bed, the light on the branches of the trees outside his window, the noise of his sparrows, and all the sounds of the awakening street aroused in him all kinds of gentle and pleasing memories of days long past which had left their imprints — indelible but, until now, not consciously realized — of contentment and happiness. It was quite the opposite of the "woe of the remembering of happy times" in Canto V of the *Inferno*, beginning: *"Nessun maggior dolore"* and so on. R.S. felt a deeper tenderness for the people whom he loved, and a warmer sympathy and understanding for many whose friendship he had lost in one way or another. Each moment of the day, every prospect on meadow or hill or sea, every change of light from dawn to dusk, excited him emotionally with an unexpected clarity of perception and a new suggestiveness of association. Thinking of the shortness of the time still left him, he reread — as though for a sort of P.P.C. conversation — the books that had meant much to him at the various stages of his life, and found them more moving, more deeply wise, or more hilariously robust, according to their natures. Everything that went on about him or within him struck upon his heart and mind with a new and powerful resonance. So, on the whole, he was far from either meriting or desiring sympathy. . . .

As his malady progressed, he had another variety of experience which, to some others more conditioned to religious belief than he was, might have signified an intimation of the separateness of body and soul.

He said to me: "Here I am, *me* as always. My mind more alive and vivid than ever before; my sensitiveness keener; my affections stronger. I seem for the first time to see the world in clear perspective; I love people more deeply and more comprehensively; I seem to be just beginning to learn my business and see my work in its proper relationship to science as a whole; I seem to myself to have entered into a period of stronger feelings and saner understanding. And yet here am I — essentially unchanged except for a sort of distillation into a more concentrated *me* — held in a damaged body which will extinguish me with it when it dies. If it were a horse I was riding that went lame or broke its neck, or a ship on which I was

traveling that sprang a leak, I could transfer to another one and leave the old vehicle behind. As it is, my mind and my spirit, my thoughts and my love, all that I really am, is inseparably tied up with the failing capacities of these outworn organs."

"Yet," he continued, apostrophizing in a serio-comic mood, "poor viscera, I can hardly blame you! You have done your best, and have served me better than could be expected of organs so abused. . . ."

Though he had these spells of half-humorous revolt against the idea that his personality and his increasing joy of living should be so helplessly at the mercy of his deteriorating body, he was still grateful that, in his case, it was this and not the mind that was going to pieces first. He was not, at any time, tempted to seek strength in wishful surrender to a religious faith in which far greater men than he had taken refuge just before death. When this had, astonishingly, happened in the cases of several of his intimate friends, he regarded it as a capitulation of the mind to the fatigue of suffering. Indeed, he became more firm in his determination to see things out consistently along his own lines of resignation to agnostic uncertainty — as his father had done before him. Moving further away, therefore, from faith in any comprehensible conception of God, he yet grew closer in conviction of the wisdom and guiding integrity of the compassionate philosophy of Christ. . . .

It is apparent, therefore, that in his last months, R. S. achieved a certain degree of philosophical tranquillity and resignation. It would be a mistake, however, to suppose that, apart from his purely personal reactions to his own fate and his immediate environment, he was less confused at the time of his death than I have described him in my introductory chapter. When he gazed beyond the circle of his own work, his family and friends, into the rushing world about him, he was completely bewildered. He had a little the same resentful feeling that he remembered having when, as a boy, he had walked through Normandy and had to jump into the ditch to let one of the recently invented automobiles rattle by — knowing that its passengers would have dinner at the town where he expected to arrive two days later. It was all moving too fast for him. Indeed, he was not sure whether the world that was rushing by was going forward or backward. He wondered whether he had not, perhaps, been born a little too soon and remained unable to catch up with his time. The world to which he had been born had not alone speeded up with that acceleration of which Henry Adams complained, but it had actually seemed to change direction. Scientific progress had brought as much sorrow as happiness. With immensely enhanced powers of production, millions were out of work and starving. Ideas of democracy and individual freedom which he had accepted as the gradually evolved goals of centuries of struggle were not only being denied, but entire nations were frantically intent on destroying them. Great racial masses seemed willing to fight and perish, if necessary, for their own enslavement. New so-called "ideologies" were tearing up the foundations of all that men had thought firm and permanently established. Something had cracked in the old Western civilization, and its walls and lofty towers — cemented with the sweat and blood of their forefathers — were tumbling about men's ears. And the intellectual calamity seemed to be that no one could say whether the turmoil was the result of avoidable stupidity or of the operation of laws of economic and social evolution that were acting on mankind as other laws had acted on the dinosaur and the sabre-toothed tiger.

But in all these things he could never tell, before he died, whether the fault was in him or in the trends he disliked. He didn't admit this, of course, and remained, to the last, argumentatively arrogant. But I knew at the time of his death he was as thoroughly bewildered as any thoughtful individual of our time is bound to be. . . .

As his disease caught up with him, R. S. felt increasingly grateful for the fact that death was coming to him with due warning, and gradually. So many times in his active life he had been near sudden death by accident, violence, or acute disease; and always he had thought that rapid and unexpected extinction would be most merciful. But now he was thankful that he had time to compose his spirit, and to spend a last year in affectionate and actually merry association with those dear to him. He set down this feeling in his last sonnet:—

Now is death merciful. He calls me hence
Gently, with friendly soothing of my fears
Of ugly age and feeble impotence
And cruel disintegration of slow years.
Nor does he leap upon me unaware
Like some wild beast that hungers for its prey,
But gives me kindly warning to prepare:
Before I go, to kiss your tears away.

How sweet the summer! And the autumn shone
Late warmth within our hearts as in the sky,
Ripening rich harvests that our love had sown.
How good that 'ere the winter comes, I die!
Then, ageless, in your heart I'll come to rest
Serene and proud, as when you loved me best.[1]

[1]Reprinted by permission of the *Atlantic Monthly*.

OLD WINE IN NEW SKINS

Occasionally the practicability, the economy and the health aspects of the paper milk bottle attract renewed attention, as at the present writing when the Milk Control Board is seeking to establish a fair price for milk so packaged. Various styles of paper bottles have been used for some years as containers in which milk can be vended, but nowhere, at least in and around Boston, have they become so popular as to constitute a familiar sight on the neighbors' back stoops.

The convenience of the non-returnable milk bottle should be apparent from the consumer's point of view, although some education might be required before the housewife would accept a quart of milk with an invisible cream line; the producer's convenience should also be served, and if expensive bottle washing, sterilizing and perhaps capping machinery could be written off his books, a real economy in milk distribution would be effected.

It is, however, the question of health that is of the most concern and in this respect the differences between glass and paper containers are not so obvious as they might appear. The fundamental superiority of the paper container rests on the assumption that when it has once been used for milk it will not be so used again. In the majority of cases this undoubtedly obtains, but in other localities it is reported that the pitcher has gone not once to the well, but often. Fortunately paper will eventually disintegrate.

Since paper bottles cannot be steam sterilized, particular care should be taken that both the materials from which the product is made, including the water used in the pulp, and the various steps in its fabrication are under suitable control. This should include tests as to the number of bacteria per gram of disintegrated stock and per cubic centimeter of bottle rinse water. In this respect it is fair to say that paper bottles properly manufactured give a much lower count on rinse water than do glass bottles washed under ordinary conditions.

Any consideration of paper milk bottles must inevitably bring to mind the great and increasing use that is made of paper containers for various types of food that are susceptible to bacterial contamination — ice cream, salads, cottage cheese, oysters and other sea food. It is a matter of local pride that Boston has been a pioneer community in the recognition of the health potentialities of paper food containers, and has for some time had suitable legislation to deal with the problem.

MEDICAL EPONYM

Dover's Powder

Promulgated by its inventor as a sovereign remedy for the gout, this formula still persists, although in a greatly modified form, finding its chief present use as a means of "breaking up" a cold. Thomas Dover (1660–1741), M.B. and buccaneer, published *The Ancient Physician's Legacy to His Country* (London: A. Bettesworth & C. Hitch, 1732), a book of medicine "designed for the use of all private families," which contains, among other things, what is probably the earliest description of rheumatic nodules. The following description of the powder appears on page 18:

> Take Opium one Ounce, Salt-Petre and Tartar vitriolated, each four Ounces, Ipocacuana one Ounce, Liquorish one Ounce. Put the Salt-Petre and Tartar into a red-hot Mortar, stirring them with a Spoon till they have done flaming. . . . Then powder them very fine; after that slice in your Opium; grind these to a Powder, and then mix the other Powders with these. Dose from forty to sixty or seventy Grains in a Glass of White-Wine Posset, going to Bed. . . . Covering up warm, and drinking a Quart or three Pints of the Posset-Drink while sweating.

R. W. B.

MASSACHUSETTS MEDICAL SOCIETY

SECTION OF OBSTETRICS AND GYNECOLOGY*

Raymond S. Titus, M.D., *Secretary*
330 Dartmouth Street
Boston

Pneumonia As a Complication of the Puerperium

Mrs. I. R., a twenty-eight-year-old para IV in labor, was admitted to the hospital as an emergency on July 6, 1936.

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section.

The family history was non-contributory. The patient's past history was not remarkable except for an operation for a "displaced womb and appendix" in 1932 and an attack of acute maxillary sinusitis and a tonsillectomy in 1934. She had been delivered by high forceps of a stillborn baby in 1929, and the next two deliveries were normal. Catamenia began at fourteen, were regular with a twenty-eight-day cycle and were not painful. The last period began on August 29, 1935, making the expected date of confinement June 5.

The pregnancy had been uneventful except for slight edema of the hands and feet a few days before admission. At that time the blood pressure and urine were normal. A general physical examination was negative except for edema of the ankles and hands. The fundus was three finger-breadths below the ensiform, with the vertex presenting and engaged. The fetal heart was heard in the right lower quadrant.

The patient had been in labor fourteen hours, and when she entered the hospital the cervix was fully dilated. The membranes ruptured shortly after entry. Before she had been fully prepared the head was bulging the perineum, and she was delivered spontaneously with median episiotomy, which was repaired a half hour after entry. Upon arrival at the hospital she had been given 3 gr. of Nembutal by mouth, and she was given whiffs of ether during the delivery and repair. At that time she vomited a large quantity of undigested food and aspirated some of it; she was semiconscious at the time. After delivery of the placenta, the patient became cyanotic. The respirations increased, and the pulse rose from 104 to 160. The patient then began to cough, and expectorated some bright-red blood. The respirations were 40. She was given 1/3 gr. of Pantopon and 1/150 gr. of atropine and was placed in an oxygen tent. She was turned on her side with the head lowered to facilitate drainage. Within two hours the temperature rose to 104°F. (rectal). During the night she regained consciousness but continued to have severe coughing attacks. The pulse remained 160 for eighteen hours, then gradually dropped. The temperature twenty hours after delivery was still 104°F. (rectal). Two days after delivery it had dropped to 101°F. and gradually to normal by the sixth day.

The patient was removed from the oxygen tent twenty-fours hours after delivery. X-ray films of the chest at this time showed "extensive mottling throughout the entire right lung and a similar, but less extensive, condition in the lower left chest." Physical examination showed moist rales throughout the entire right lung and at the left base, which disappeared about three days post partum. Repeat x-ray films on the ninth day revealed that the mottling previously noted had entirely cleared up. The patient was discharged on the tenth postpartum day.

Comment. This case illustrates a serious complication that may follow inhalation anesthetics during labor, particularly when labor occurs soon after a full meal. The treatment was ideal and fortunately adequate.

STATED MEETING OF THE COUNCIL

A STATED meeting of the Council will be held in John Ware Hall, Boston Medical Library, 8 Fenway, Boston, on Wednesday, October 2, 1940, at 10:30 a.m.

Business:

1. Call to order at 10:30 a.m.
2. Presentation of record of last meeting. (Published in *New England Journal of Medicine*, 222:1040–1048, 1940.)
3. Reports of standing and special committees.
4. Appointment of an auditing committee.
5. Fill any vacancies in the offices of the Society.
6. Incidental business.

ALEXANDER S. BEGG, *Secretary.*

Councilors are asked to sign one of the two attendance books before the meeting. The Cotting Luncheon will be served immediately after the meeting.

CORRESPONDENCE

RESULTS OF NOVEMBER, 1939, BOARD EXAMINATIONS

To the Editor: I am enclosing a statement of the results of the November, 1939, examination conducted by the Board of Registration in Medicine.

STEPHEN RUSHMORE, M.D., *Secretary.*

State House, Boston

School	First Time		Second or Third Times		Fourth or More Times		Total		Total Applicants
	Passed	Failed	Passed	Failed	Passed	Failed	Passed	Failed	
Boston University School of Medicine*	4						4		4
College of Physicians and Surgeons (Boston)	3	6	1	6	1	3	5	15	20
Harvard Medical School*	9						9		9
Massachusetts College of Osteopathy†		4	1	7		2	1	13	14
Middlesex University School of Medicine	8	11	14	29	2	14	24	54	78
Tufts College Medical School*	8			1			8	1	9
Baylor University College of Medicine*		1						1	1
Chicago College of Osteopathy†		1						1	1
College of Medical Evangelists*		1						1	1
Cornell University Medical College*	1						1		1
Creighton University School of Medicine*	1						1		1
Georgetown University School of Medicine*	1	1					1	1	2
Jefferson Medical College of Philadelphia*	1						1		1
Johns Hopkins University School of Medicine*	1						1		1
Kansas City University of Physicians and Surgeons	1	1	3	10		5	4	16	20
Kirksville College of Osteopathy and Surgery†		1		5	1	1	1	7	8
Mid-West Medical College	1	3		3	1	4	2	10	12
Missouri College of Medicine and Science				1				1	1
New York University College of Medicine*	1						1		1
Northwestern University Medical School*	1						1		1
Ohio State University College of Medicine*	1						1		1
Philadelphia College of Osteopathy†			2	3			2	3	5
Rush Medical College of the University of Chicago*	3						3		3
St. Louis College of Physicians and Surgeons				1				1	1
State University of Iowa College of Medicine*	1						1		1
Temple University School of Medicine*	1						1		1
Tulane University of Louisiana School of Medicine*	1						1		1
University of Chicago School of Medicine*	1						1		1
University of Illinois College of Medicine*	1						1		1
University of Nebraska College of Medicine*	1						1		1
University of Pennsylvania School of Medicine*	1						1		1
University of Tennessee College of Medicine*	1						1		1
University of Wisconsin Medical School*	2						2		2
Wayne University College of Medicine*	1						1		1
Woman's Medical College of Pennsylvania*	1						1		1
Anderson University, Scotland*	1						1		1
McGill University*	1						1		1
Royal University, Hungary*	1	1					1	1	2
University of Berlin*	3	1					3	1	4
University of Bern*	1				1		2		2
University of Bologna*		1						1	1
University of Breslau*	1						1		1
University of Brussels*	2						2		2
University of Edinburgh*						1		1	1
University of Frankfort*	1						1		1
University of Freiburg*			1				1		1
University of Geneva*	1		1				2		2
University of Goettingen*	1						1		1
University of Hamburg*	1	1					1	1	2
University of Koenigsberg*		1						1	1
University of Lausanne*			2				2		2
University of Milan*	1						1		1
University of Munich*	1		1				2		2
University of Naples*		1				1		2	2
University of Paris*		1						1	1
University of Prague*	1	1	1	1			2	2	4
University of Rome*			1				1		1
University of Strassburg*	1						1		1
University of Vienna*	8	1	1				9	1	10
	83	39	29	67	6	31	118	137	255

*Approved schools.
†Osteopathic schools.

Approved schools‡	70	12^{9}‡	8	2^{1}	1	2^{3}	79	16^{12}	95
Non-approved schools	13	21	18	50	4	25	35	97	132
Osteopathic schools		6	3	15	1	3	4	24	28
	83	39	29	67	6	31	118	137	255

‡The exponents represent graduates of European schools.

ARTICLES ACCEPTED BY THE COUNCIL ON PHARMACY AND CHEMISTRY, AMERICAN MEDICAL ASSOCIATION

To the Editor: In addition to the articles enumerated in our recent letter the following have been accepted:

Endo Products, Inc.
- Ampoules Camphor In Oil — Endo, 0.2 gm. (3 gr.), 1 cc.
- Ampoules Camphor In Oil — Endo, 0.2 gm. (3 gr.), 2 cc.

Flint, Eaton & Co.
- Tablets Sulfanilamide, 5 gr.

Lederle Laboratories, Inc.
- Tuberculin Patch Test (Vollmer)
- Solution Liver Extract Parenteral — Lederle, 10-cc. vial

Eli Lilly & Co.
- Ampoule Solution Liver Extract — Lilly, 15 U.S.P. units per cc. 10 cc.-size
- Ampoule Solution Liver Extract — Lilly, 2 U.S.P. units per cc. 3.5-cc. size

Wm. S. Merrell Company
- Thiamine Hydrochloride — Merrell
  - Thiamine Hydrochloride Tablets — Merrell, 1.0 mg.
  - Thiamine Hydrochloride Tablets — Merrell, 3.0 mg.
  - Ampuls Solution Thiamine Hydrochloride — Merrell, 1.0 mg., 1 cc.
  - Ampuls Solution Thiamine Hydrochloride — Merrell, 6.0 mg., 1 cc.
  - Ampuls Solution Thiamine Hydrochloride — Merrell, 10.0 mg., 1 cc.

E. R. Squibb & Sons
- Follutein — Squibb
  - Vials Follutein — Squibb, 500 international units
  - Vials Follutein — Squibb, 1000 international units
  - Vials Follutein — Squibb, 5000 international units

U. S. Standard Products Co.
- Pituitary Solution, U.S.P.
  - Ampuls Pituitary Solution, U.S.P., 1 cc.
  - Ampuls Pituitary Solution, U.S.P., ½ cc.
  - Vials Pituitary Solution, U.S.P., 10 cc.
  - Vials Pituitary Solution, U.S.P., 30 cc.

John Wyeth & Brother, Inc.
- Tablets Sulfanilamide, 5 gr.
- Tablets Sulfanilamide, 7½ gr.
- Tablets Sulfanilamide, 10 gr.

The following products have been accepted for inclusion in the list of articles and brands accepted by the Council but not described in N.N.R. (*New and Nonofficial Remedies,* 1940, p. 560):

Lakeside Laboratories
- Ampules Quinine and Urea Hydrochloride — Lakeside, 5 per cent, 2 cc. (for intravenous use)
- Ampules Quinine and Urea Hydrochloride — Lakeside, 1 per cent, 1 cc. (for subcutaneous use)
- Ampules Quinine and Urea Hydrochloride — Lakeside, 1 per cent, 5 cc. (for subcutaneous use)

PAUL NICHOLAS LEECH, *Secretary.*

535 North Dearborn Street,
Chicago, Illinois.

NOTICES

ANNOUNCEMENT

CHARLES H. KELLEY, M.D., announces the removal of his office to 37 Beacon Street, Boston.

BOSTON DOCTORS' SYMPHONY ORCHESTRA

The Boston Doctors' Symphony Orchestra will resume rehearsals under Alexander Thiede, on Thursday evening, October 10. Those interested in becoming members should communicate with Dr. Julius Loman, Pelham Hall Hotel, Brookline (BEA 2430).

CONSULTATION CLINICS FOR CRIPPLED CHILDREN IN MASSACHUSETTS, UNDER THE PROVISIONS OF THE SOCIAL SECURITY ACT

CLINIC	DATE	ORTHOPEDIC CONSULTANT
Haverhill	October 2	William T. Green
Lowell	October 4	Albert H. Brewster
Salem	October 7	Harold C. Bean
Brockton	October 10	George W. Van Gorder
Gardner	October 15	Mark H. Rogers
Northampton	October 16	Garry deN. Hough, Jr.
Worcester	October 18	John W. O'Meara
Pittsfield	October 21	Francis A. Slowick
Hyannis	October 22	Paul L. Norton
Fall River	October 28	Eugene A. McCarthy

FORTY-FIRST ANNUAL MEETING OF THE AMERICAN ROENTGEN RAY SOCIETY

The forty-first annual meeting of the American Roentgen Ray Society will be held at the Hotel Statler, Boston, October 1–4.

A symposium will be held each morning as follows: October 1, diagnosis and treatment of carcinoma of the larynx; October 2, classification, treatment and prognosis of carcinoma of the thyroid; October 3, unusual forms of pulmonary disease; and October 4, unusual gastrointestinal lesions and unusual sources of gastrointestinal hemorrhage.

A special clinical lecture of general interest will be given immediately after lunch each day, followed by individual instruction courses in the afternoon. Well-known specialists throughout the country will conduct these scientific sessions.

There will be a special ladies' program. The annual golf tournament will take place on Monday, September 30. Conferences and general meetings are open to physicians and medical students; a fee is charged for the instruction courses. For further information write to Dr. Frederick W. O'Brien, chairman of the publicity committee, 465 Beacon Street, Boston.

SOCIETY MEETINGS AND CONFERENCES

SEPTEMBER 27, 28 — New England Surgical Society. Poland Spring, Maine.

OCTOBER 1–4 — Forty-First Annual Meeting of the American Roentgen Ray Society. Notice above.

OCTOBER 6–11 — Annual meeting of the American Academy of Ophthalmology and Otolaryngology. Page 81, issue of July 11.

OCTOBER 8–11 — American Public Health Association. Page 655, issue of April 11.

OCTOBER 9 — New England Dermatological Society. Page 390, issue of September 5.

OCTOBER 10 — Pentucket Association of Physicians.

OCTOBER 11, 12 — Pan-American Congress of Ophthalmology. Page 898, issue of May 23.

OCTOBER 14–25 — 1940 Graduate Fortnight of the New York Academy of Medicine. Page 305, issue of August 22.

October 21 — American Board of Internal Medicine. Page 369, issue of February 29.
November 13, 14 — New England Postgraduate Assembly. Cambridge, Massachusetts.
January 4, 1941 — American Board of Obstetrics and Gynecology. Page 1064, issue of June 20.
March 8 — American Board of Ophthalmology. Page 201, issue of August 1.
April 21–25 — American College of Physicians. Page 1065, issue of June 20.
June 2–6 — American Medical Association. Cleveland, Ohio.

District Medical Societies

SUFFOLK

November 7 — Censors' meeting. Page 305, issue of August 22.

WORCESTER

October 9 — Rutland State Sanatorium, Rutland.
November 13 — Grafton State Hospital, Grafton.
December 11 — St. Vincent Hospital, Worcester.
January 8, 1941 — Worcester City Hospital, Worcester.
February 12 — Worcester State Hospital, Worcester.
March 12 — Memorial Hospital, Worcester.
April 9 — Hahnemann Hospital, Worcester.

Supper will be served at 6:30 p.m. followed by a business meeting and scientific program.

BOOKS RECEIVED

The receipt of the following books is acknowledged, and this listing must be regarded as a sufficient return for the courtesy of the sender. Books that appear to be of particular interest will be reviewed as space permits. Additional information in regard to all listed books will be gladly furnished on request.

Physical Diagnosis. By William Nance Anderson, B.Sc., M.D., associate clinical professor of medicine, University of Southern California School of Medicine, Los Angeles, California. 8°, cloth, 424 pp., with 92 illustrations. Philadelphia: Lea & Febiger, 1940. $4.75.

Pharmacology and Therapeutics. By Arthur R. Cushny, M.A., M.D., LL.D., F.R.S., late professor of materia medica and pharmacology, University of Edinburgh. Twelfth edition. Thoroughly revised by C. W. Edmunds, A.B., M.D., professor of materia medica and therapeutics, University of Michigan, Ann Arbor, Michigan, and J. A. Gunn, M.A., M.D., D.Sc., F.R.C.P., professor of pharmacology and director of the Nuffield Institute for Medical Research, University of Oxford, Oxford, England. 8°, cloth, 852 pp., with 66 illustrations. Philadelphia: Lea & Febiger, 1940. $6.50.

The Chinese Way in Medicine. By Edward H. Hume, M.D. 8°, cloth, 189 pp., with 8 illustrations. Baltimore: Johns Hopkins Press, 1940. $2.25.

The Virus: Life's enemy. By Kenneth M. Smith, F.R.S. 12°, cloth, 176 pp., with 19 illustrations. Cambridge, England, University Press; New York: Macmillan Company, 1940. $2.00.

BOOK REVIEWS

Demonstrations of Physical Signs in Clinical Surgery. By Hamilton Bailey, F.R.C.S. (Eng.), Seventh edition. 8°, cloth, 310 pp., with 377 illustrations. Baltimore: Williams & Wilkins Company, 1940. $6.50.

In thirteen years this work has had seven editions, and there have been second impressions of four of them. Last year it appeared in German, and translations into Portuguese, Italian and Dutch are now in preparation. The work is popular because it is practical. The author states in the preface, "The scope and object of the book remain as before — essentially a demonstration of physical signs." The text is terse and helpfully supplemented by nearly four hundred well-chosen illustrations. The body is considered regionally in twenty-six chapters. The physician is taught to use his eyes, his hands and his head, and to make each physical examination an exercise in the practical application of anatomy and physiology.

This small volume is well bound; the typography is excellent, and the calendered paper enhances the distinctness of the cuts.

Injuries of the Skull, Brain and Spinal Cord: Neuropsychiatric, surgical, and medico-legal aspects. Edited by Samuel Brock, New York University. 8°, cloth, 632 pp., with 63 illustrations and 4 tables. Baltimore: Williams & Wilkins Company, 1940. $7.00.

This book consists of a series of twenty-two chapters by various authors on injuries to the central nervous system. Such subjects as osteomyelitis of the cranial bones, thrombophlebitis, concussion and contusion of the brain, intracerebral hemorrhage, extradural hematoma, brain abscess, posttraumatic convulsive and allied states, neuroses following head and brain injuries, malingering, x-ray diagnoses of skull fracture and brain injury, birth injuries of the spinal cord and the effects of electric shock on the central nervous system are considered in the various chapters.

Most of these chapters are well written, although a number of them leave much to be desired in regard to the style of presentation and the reduplication of statements. The book would have been greatly improved had the editor rewritten all the contributions, for one of the best chapters — general considerations in injuries of the skull, brain and spinal cord — is by him. The final chapter is on the medicolegal aspects of injuries of the skull, brain and spinal cord. This is diffusely written, giving a great deal of information about matters other than those rightfully considered by the limitations of the title. Much of the material is, therefore, redundant; this criticism could be easily applied to the whole book. Had it been carefully edited, one estimates that the pages could have been reduced by a third.

The few illustrations and the format are excellent, and in general the typography is good. The type of paper used makes the book extraordinarily heavy — it weighs over three pounds. Although this book is of distinct value to the subject of a type that is badly needed, one regrets that it was not edited with more care.

One Way of Living. By James Bridie. 8°, cloth, 299 pp. London: Constable and Company, Limited, 1939. $1.70.

This is the amusing autobiography of a Scotchman who has achieved eminence, not only as a medical man but also as a journalist and a playwright — all this, by remaining quite passive in the hands of fate. But the amiable "sloth" which envelops him is, of course, no such thing. Dr. James Bridie has a sharp mind, a keen memory, a wide acquaintance with men and matters, a sense of humor and an apparently unfailing sympathy with human foibles. In this war-torn and troubled world, too often one has difficulty in driving oneself to read; this book, however, may brighten one's point of view.

The Surgery of Pain. By René Leriche, M.D. (Lyon), LL.D. (Glas.), F.R.C.S. Eng. (hon. causa), and so forth. Translated and edited by Archibald Young. 8°, cloth, 512 pp., with 18 illustrations. Baltimore: Williams & Wilkins Company, 1939. $6.50.

Halsted once pointed out that hemorrhage, sepsis and pain were the particular problems of the surgeon. Much has been accomplished toward the solution of the first two which can be measured and studied objectively, but pain, inherently subjective and personal, and often apparently unaccompanied by organic disease, has remained largely an enigma. The investigation of pain has not, perhaps, attracted so many keen minds as have other less vague fields. The appearance of a book therefore by a surgeon who has devoted the greater part of his energy and time for more than twenty-five years to the study and alleviation of pain is a noteworthy event.

The volume, consisting of nineteen lectures delivered at the *College de France,* is admirably translated by the late Professor Young, of Glasgow, who also summarizes the author's clinical and investigative experience at Strassburg. There is much theorizing and fine Gallic reasoning, with a liberal sprinkling of philosophy, but the tone in general is practical. Many of the author's concepts will find little support in this country, but their originality cannot be denied. The style is unusual in a medical book, and refreshingly far from dry or pedantic. Angina pectoris, the various neuralgias, including trigeminal neuralgia, and the pain of terminal malignancy are particularly well discussed.

Of timely interest, in view of the current war, are the author's views regarding causalgia, painful cicatrices and amputation stumps. The book is highly recommended to all surgeons.

The Diagnosis and Treatment of Diseases of the Esophagus. By Porter P. Vinson, B.S., M.A., M.D., D.Sc., F.A.C.P. 8°, cloth, 224 pp., with 98 illustrations. Illinois: Charles C Thomas, 1940. $4.00.

There has long been need for a comprehensive book on the esophagus by a competent authority. Vinson's lifelong experience in the handling of patients with esophageal disease makes him eminently qualified for the task. Written from the standpoint of a physician and endoscopist, it covers, in sixteen chapters, dysphagia, esophagoscopy, carcinoma, cicatricial stricture, congenital stricture, cardiospasm, diffuse spasm, diverticula, hysterical and functional dysphagia, injury and perforation, benign tumors, varices, fungous infections, syphilis, tuberculosis, esophagitis, foreign bodies, fistula, extra-esophageal lesions and gastroscopy. The bibliography, totaling 441 references, is conveniently subdivided at the end of each chapter. No attempt is made to describe surgical technic, but indications for surgery are discussed.

Although in general it is possible to agree with the author's ideas in the management of esophageal disease there are two important subjects, carcinoma and cardiospasm, with which many would disagree.

In the diagnosis of carcinoma, Vinson advises three methods of examination in the following order: x-ray; passage of sounds over a previously swallowed silk thread; and esophagoscopy. He suggests the passage of sounds in order to determine the density and length of the stricture and to get small fragments of tissue for microscopic study. While all would agree that x-ray examination is of first importance, most esophagologists would say that endoscopic examination should come next, not only for direct inspection and bouginage, but particularly for biopsy. The passage of sounds over a thread is of value in treatment but rarely in diagnosis. Vinson does well to emphasize this method of treating carcinoma of the esophagus, for all too frequently an unnecessary gastrostomy is performed, perhaps allowing the esophagus to close down completely and often depriving the patient of the pleasure of eating. Furthermore, as he points out, gastrostomy in debilitated patients carries with it a mortality of 10 to 50 per cent. It seems to the reviewer that Vinson overestimates the discomfort and risk of esophagoscopy, and certainly his figure of 25 per cent negative biopsies is much too high. Furthermore, no mention is made of the fact that esophagoscopy may disclose lesions not demonstrable by other methods of examination.

The other point which seems worthy of comment concerns the treatment of cardiospasm; here the author discusses bouginage over a thread, the use of the hydrostatic dilator and various other methods, but he makes no mention of the Hurst mercury bougie. When it is considered that this last method is particularly safe, simple and efficacious, it seems that it should be included in any discussion of the treatment of cardiospasm.

Although, as previously noted, it is possible to find statements with which many would not agree, the book as a whole is excellent; it is well illustrated, and presents a great deal of valuable and unusual information. Every esophagoscopist and most gastroenterologists should read this book, and many of them should purchase it for their libraries.

Fluorine Intoxication. By Kaj Roholm, M.D. 4°, paper, 364 pp. London: H. K. Lewis & Company, Ltd., 1937. $4.03.

This book is a thorough and well-presented study covering various aspects of fluorine intoxication.

Acute fluorine intoxication may be caused by the inhalation of fumes of gaseous forms of fluorides (or hydrofluoric acid), or by the ingestion of dissolved or easily soluble fluoride compounds, most commonly encountered as insecticides or rat poisons.

Chronic fluorine intoxication is of recent recognition. Fluorine has been found to have a specific effect on osseous and dental tissue. Mottled teeth, a dental disease endemic to man in certain geographical areas, has been traced to the relatively high fluorine content of drinking water. In individuals working with cryolite, — a double fluoride of sodium and aluminum, — osteosclerosis has been noted as an occupational disease. In herbivora in the environs of certain factories in Europe chronic intoxication has resulted in a disease like osteomalacia. *Darmous,* a dental and mandibular disease, in herbivora in certain parts of North Africa, and *Gaddur,* a dental and bone disease, in herbivora in Iceland after volcanic eruptions have also been traced to chronic fluorine intoxication.

As in the introduction, the review of the role of fluorine in biology provides a good background and foundation of the subject. The author's original investigations, his study of spontaneous cryolite poisoning and his experimental work on animals are clearly presented. Individual topics are thoroughly covered. The discussion and general conclusions summarize the major points. An extensive bibliography is appended, and the text has numerous charts and photographs.

Although the study is sufficiently extensive to be considered a reference book of primary interest to those dealing with fluorine problems, the non-specialist with interest in its related fields will find it well written and interesting.